

Shelve in Stacks S.B.T.

Highway Safety Literature

Annual Cumulation 1969

Highway Safety Bibliography. . .

HS-820 074

Issues 69-1 through 69-50

January-December 1969



U.S. Department of Transportation / National Highway Safety Bureau

**HIGHWAY SAFETY LITERATURE
ANNUAL CUMULATION 1969
HIGHWAY SAFETY BIBLIOGRAPHY**

**Issues 69-1 through 69-50
[January - December 1969]**

Published by
National Highway Safety Bureau

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EDITOR'S NOTE: Material published in HIGHWAY SAFETY LITERATURE (HSL) is intended for the information and assistance of the motor vehicle highway safety community. While brand names, equipment model names and information, and companies may be mentioned from time to time, this data is included as an information service. Inclusion of this information in the HSL should not, under any circumstances, be construed as an endorsement or an approval by the Department of Transportation of any particular product, course, or equipment.

INTRODUCTION

The Technical Information System of the National Highway Safety Bureau acquires scientific and technical information covering all phases of traffic and motor vehicle safety, especially on those subjects encompassed by the National Traffic and Motor Vehicle Safety Act of 1966, and the National Safety Act of 1966. Each week, citations to these acquisitions are published in HIGHWAY SAFETY LITERATURE.

This publication is a five volume set which cumulates all citations which appeared in HIGHWAY SAFETY LITERATURE during 1969. Each volume covers one broad subject field and is arranged by group according to the NHSB SUBJECT CATEGORY FIELDS AND GROUPS listed below:

NHSB SUBJECT FIELDS AND GROUPS

- 1/0 ACCIDENTS** HS-820 073
- /1 Emergency Services (11, 15-16)
 - /2 Injuries
 - /3 Investigation and Records (10, 14-15)
 - /4 Locations (9, 14)

- /4 Governmental Aspects
- /5 Information Technology
- /6 Insurance
- /7 Mathematical Sciences
- /8 Transportation Systems

- 2/0 HIGHWAY SAFETY** HS-820 074
- /1 Breakaway Structures
 - /2 Communications
 - /3 Debris Hazard Control and Cleanup (15-16)
 - /4 Design and Construction (12, 14)
 - /5 Lighting (14)
 - /6 Maintenance (12)
 - /7 Meteorological Conditions
 - /8 Police Traffic Services (15)
 - /9 Traffic Control (13-14)
 - /10 Traffic Courts (7)
 - /11 Traffic Records (10)

- 3/0 HUMAN FACTORS** HS-820 075
- /1 Alcohol (8, 14)
 - /2 Anthropomorphic Data
 - /3 Cyclists
 - /4 Driver Behavior
 - /5 Driver Education (4, 14)
 - /6 Driver Licensing (5, 10, 14)
 - /7 Drugs Other Than Alcohol
 - /8 Environmental Effects
 - /9 Impaired Drivers
 - /10 Passengers
 - /11 Pedestrians (14-15)
 - /12 Vision


- 4/0 OTHER SAFETY-RELATED AREAS** HS-820 076
- /1 Codes and Laws (6)
 - /2 Community Support (17)
 - /3 Cost Effectiveness

- 5/0 VEHICLE SAFETY** HS-820 077

* All Federal Motor Vehicle Safety Standards apply to passenger vehicles. An asterisk before a subject group indicates additional types of vehicles to which the indicated standards may apply.

- /1 Brake Systems (102, 105-6, 116)
- * /2 Buses, School Buses, and Multipurpose Passenger Vehicles (102-4, 106-8, 111-3, 116, 205-6, 209, 211)
- * /3 Cycles (3; 108, 112, 116, 205)
- /4 Design (14; 101-2, 105, 107, 201)
- /5 Door Systems (201, 206)
- /6 Fuel Systems (101, 301)
- /7 Glazing Materials (205)
- /8 Hood Latch Systems (113)
- /9 Inspection (1)
- /10 Lighting Systems (101, 105, 108, 112)
- /11 Maintenance and Repairs
- /12 Manufacturers, Distributors, and Dealers
- /13 Mirrors and Mountings (107, 111)
- /14 Occupant Protection (15; 201-4, 207-10)
- /15 Propulsion Systems
- /16 Registration (2, 10)
- /17 Safety Defect Control
- /18 Steering Control System (101, 107, 203-4)
- /19 Theft Protection (114-5)
- * /20 Trucks and Trailers (102-4, 107-8, 112-3, 116, 205-6, 209)
- /21 Used Vehicles
- /22 Wheel Systems (109-10, 211)
- /23 Windshield-Related Systems (101, 103-4, 107, 205, 212)

SAMPLE ENTRIES

Subject Category Array  HS-800 069 Fld. 5/22

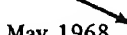
NHSB Accession no. HS-800 069 Fld. 5/22

Title of document DEVELOPMENT OF A TEXTILE
CORD LOAD TRANSDUCER

Personal author(s) by B. E. Bourland, S. K. Clark, R. N.
Dodge

Corporate author Michigan Univ., Ann Arbor. Tire and
Suspension Systems Research Group,

ID Code number M43800

Collation  39p

Publication date May 1968
Contract CST377
Report no. 01193-1-T

Abstract A technique is described for building
directly into a tire cord a small force
transducer to measure tire cord loads
directly....

Search terms: Tire loads, Trans-
ducers, Tire design, Pneumatic tires

AVAILABILITY: From CFSTI

HS-004 497 Fld. 5/19

AUTO THEFT-THE PROBLEM
AND THE CHALLENGE

by Thomas A. Williams, Sr.

Journal citation Published in *FBI Law Enforcement
Bulletin* v37 n12 p15-7 (Dec 1968)

Gives figures on the extent of the
auto theft problem and comments on
antitheft devices available now or in
the planning stage.

Search terms: Theft, Theft protec-
tion, Stolen cars

AVAILABILITY OF DOCUMENTS

Department of Transportation personnel may borrow copies of publications directly from the NHSB, Technical Reference Division (Phone: 426-2768 or 426-2769). Non-DOT personnel should contact their company or agency libraries for assistance.

Journals cited can be found in most research libraries. Reprints of journal articles can often be obtained without charge from the individual author, whose affiliation is usually given in the article.

Contractors reports and other documents can usually be obtained as indicated under AVAILABILITY. However, there is no certainty that retention copies will be available for more than a limited period after a document is issued.

The more common distribution sources are identified by symbols which are explained below:

CFSTI: Clearinghouse for Federal Scientific and Technical Information, Springfield, Va. 22151. Order by accession number: AD or PB; order NHSB contractors reports by HS numbers if a PB number is not given. Prepayment is required

by CFSTI coupon (GPO coupons are not acceptable), check, or money order (made payable to the Clearinghouse). HC (Paper copy; full size original or reduced facsimile) \$3.00; MF (Microfiche; approximately 4x6" negative sheet file; special reader required) \$0.65.

GPO: Superintendent of Documents, U.S. Government Printing Office, Washington, D. C. 20402. Give corporate author, title, personal author, and report number. Prepayment is required by GPO coupon (CFSTI coupons are not acceptable), check, or money order (made payable to the Superintendent of Documents).

HRB: Highway Research Board, National Academy of Sciences, 2101 Constitution Ave., N.W., Washington, D. C. 20418.

FHWA-OPA: Federal Highway Administration, Washington, D.C. 20591. Office of Public Affairs.

NHSB: National Highway Safety Bureau, Washington, D. C. 20591.

SAE: Society of Automotive Engineers, 2 Pennsylvania Plaza, New York, N.Y. 10001. Prices given are list; discounts are available to members and sometimes to libraries and U.S. Government agencies. Prepayment is required; orders without payment are subject to \$1 handling charge.

UMF: University Microfilms, 300 North Zeeb Road, Ann Arbor, Michigan 48106. Order dissertations by order number and author's name. Do not send payment with order. Invoice sent with shipment will include cost of order plus handling and shipping charges. HC (Bound, soft cover, xerographic copies, approx. 5 1/2 x 8 1/2"); MF (positive 35mm microfilm).

OTHER NHSB TECHNICAL INFORMATION SYSTEM PUBLICATIONS

Available in single copies at no cost from DOT, NHSB, Technical Information System, Room 5116G, Washington, D. C. 20591.

NHSB Subject Category List, September 1969 - HS-820 051
NHSB Corporate Author Authority List, January 1970 - HS-820 069
NHSB Thesaurus Rules and Conventions, January 1970

In Process:

NHSB Guidelines for Subject Analysis of Documents, 1970
NHSB Thesaurus of Traffic and Motor Vehicle Safety Terms, June 1970
NHSB Cumulative Indexes

2/0 HIGHWAY SAFETY

HS-004 315 2/0; 5/0

REQUIREMENTS FOR MOTOR VEHICLE AND HIGHWAY SAFETY RESEARCH AND TEST FACILITIES

Department of Transportation.
Washington, D.C.

Oct 1968: 39p

This report identifies the types of facilities required to implement the motor vehicle and highway safety program. Summaries of these programs, the types of tests related to them, facility elements for making needed tests, proposed safety facilities program and recommended implementation are presented.

Search terms: Accident research; Test facilities; Driver performance; Safety research; Motor vehicle performance; Highway safety; Performance tests; National Highway Safety Bureau

AVAILABILITY: Corporate author

HS-004 316 2/0; 5/0

REQUIREMENTS FOR MOTOR VEHICLE AND HIGHWAY SAFETY RESEARCH AND TEST FACILITIES

Department of Transportation.
Washington, D. C.

Oct 1968 142p. 15 refs.

A Report to the Congress from the Secretary of Transportation. Vol. 2.

Vehicle and highway safety programs; types of related tests and measurements and facility elements; suitability of existing facilities; and a proposed safety facilities program are presented. Findings indicate that there are no suitable driving simulation facilities for automobiles; the only existing test tract complexes approaching government requirements are owned by automobile manufacturers.

Search terms: Motor vehicle performance; Highway safety; Motor vehicle safety; Safety research; Test facilities; Test tracks; Crash injury

research; Driving simulation; Accident research; Driver performance; National Highway Safety Bureau

AVAILABILITY: Corporate author

NHSB CONTRACTORS REPORTS

HS-800 019 Fld. 2/0; 3/2; 5/4

RESEARCH IN CRASHWORTHINESS OF VEHICLE STRUCTURES. VOL. 1

by D. J. Bozich

Wyle Lab., Huntsville, Ala.

Mar 1968 96 p.

Contract FH-11-6669

Report no. WR-68-3-Vol-1; PB-180466

Program of basic studies to deal with long-range research involving: carefully instrumented experimental crashes closely correlated with intensive medico-engineering investigations for actual crashes; use of laboratory static and dynamic tests including detailed structural analysis evaluated against field observations; and evaluation of human body as a structure to develop means of supporting and protecting it for crash injury.

Search terms: Crash simulation; Laboratory tests; Structural analysis; Passenger packaging; Restraint systems; Human body; Human factors engineering; Medical factors; Motor vehicle design; Crashworthiness

AVAILABILITY: CFSTI

HS-800 049 2/0; 5/0

FACILITY REQUIREMENTS STUDY. VOL. 1. ANALYSIS OF FACILITY REQUIREMENTS FOR THE TRAFFIC SAFETY RESEARCH CENTER

Booz. Allen Applied Research, Inc.,
Bethesda, Md.

31 Oct 1967 253 p.

Contract FH-11-6563

Report no. PB-180 580

Phases of investigation were: defining current and near future NHSB traffic safety programs; analyzing and defining facilities and equipment required; developing conceptual design, quantitative requirements and acquisition plan for Traffic Safety Research Center. Detailed descriptions are provided of 244 traffic safety programs. The proposed Research Center would have eight divisions for research and programs on all aspects of traffic safety; would have a staffing of 2,159 and a building complex of 745,000 square feet on 6,000 acres of grounds. Vehicle and driver testing tracks would be included. Site selection criteria are given. Acquisition costs would be \$133 million. Operating costs from fiscal 1968 to fiscal 1976 would be \$300 million.

Search terms: Test facilities; Traffic safety; Motor vehicle safety; Test equipment; Test tracks; Driver tests; Costs

AVAILABILITY: CFSTI as PB-180 580

HS-800 050 Fld. 2/0; 5/0

FACILITY REQUIREMENTS STUDY. Vol. 2. CONCEPTUAL DESIGN OF TRAFFIC SAFETY RESEARCH CENTER

Booz-Allen Applied Research, Inc.,
Bethesda, Md.

31 Oct 1967 162 p.

Contract FH-11-6563

Report no. PB-180 581

Second volume of a study defining traffic safety programs for the National Highway Safety Bureau, analyzing the facilities and equipment needed to carry them out, and giving conceptual design quantitative requirements and acquisition plan for a Traffic Safety Research Center to conduct them. This volume gives details for the conceptual design: buildings, vehicle testing facilities, equipment, personnel, offices space. Costs are detailed for all parts of design.

2/0 Highway Safety (Cont.)

HS-800-050 (Cont.)

Search terms: Test facilities; Traffic safety; Motor vehicle safety; Test equipment; Test tracks; Driver tests; Costs

AVAILABILITY: CFSTI as PB-180 581

HS-800 051 Fld. 2/0; 5/0

FACILITY REQUIREMENTS STUDY. Vol. 3. RECOMMENDED TRAFFIC SAFETY PROGRAM ACTIVITIES FOR THE NATIONAL HIGHWAY SAFETY BUREAU.

Booz.Allen Applied Research, Inc., Bethesda, Md.

31 Oct 1967 333 p.
Contract FH-11-6563
Report no. PB-180 582

Third volume of a study defining traffic safety programs for the NHTSB, analyzing the facilities and equipment needed to carry them out, and giving conceptual design, quantitative requirements and acquisition plan for a Traffic Safety Research Center to conduct them. This volume gives details of 244 recommended traffic safety programs, based upon a review of NHTSB policies, recommendations from subcontracted traffic safety consultants, literature review, and interviews with government, institutional, and industrial organizations with significant interest in the traffic safety problem. Programs are divided into groups: driver, occupant-vehicle interface, vehicle, vehicle-highway interface, highway, highway-driver interface, pedestrian-vehicle interface, and regulatory.

Search terms: Test facilities; Traffic safety; Motor vehicle safety; Test equipment; Safety programs; Occupant-vehicle interface; Driver characteristics; Regulations; Highway characteristics; Pedestrian characteristics

AVAILABILITY: CFSTI as PB-180 582

HS-800 053 Fld. 2/0; 5/0

FACILITY REQUIREMENTS STUDY Vol. 1. Summary

Operations Research, Inc., Silver Spring, Md.

31 Oct 1967 34p
TR-457-Vol. 1 FH-11-6565

Volume I (of III) of the final report on the National Highway Safety Bureau test facilities summarized the requirements for the 5 proposed facilities and the 5 stations.

Search terms: Safety research; Research facilities; Test facilities; Equipment; Automotive research; National Highway Safety Bureau

AVAILABILITY: CFSTI

HS-800 054 Fld. 2/0; 5/0

FACILITY REQUIREMENTS STUDY. Vol. 2. Technical Report

Operations Research, Inc., Silver Spring, Md.

31 Oct 1967 249 p.
TR-457-Vol. 2 FH-11-6565

Volume II (of III) of the final report on the National Highway Safety Bureau test facilities describes the methodology and the intermediate products developed.

Search terms: Research facilities; Test facilities; Equipment; Automotive Research; National Highway Safety Bureau

AVAILABILITY: CFSTI

HS-800 055 Fld. 2/0; 5/0

FACILITY REQUIREMENTS STUDY. Vol. 3. Appendices

Operations Research, Inc., Silver Spring, Md.

31 Oct 1967 220 p.
TR-457-Vol. 3 FH-11-6565

Volume III (of III) of the final report on the National Highway Safety Bureau test facilities contains the 7 appendices that provide the supporting

data used in this study.

Search terms: Research facilities; Test facilities; Equipment; Automotive research; National Highway Safety Bureau

AVAILABILITY: CFSTI

2/0 Highway Safety (Cont.)

Report no. 54600-Vol. 1

Purpose of inventory is to locate test facilities and equipment, publicly or privately owned, which could be used in support of the highway and motor vehicle safety requirements. Study was conducted in accordance with requirements of Public Law 89-563. Some 3,400 facilities were identified and each was sent a questionnaire to determine their willingness and availability to participate in present and future Department of Transportation programs, to determine number and types of test facilities related to contemplated programs, and to assess capability of these facilities to carry out projected requirements. Some 350 completed questionnaires were evaluated, and on-site surveys conducted for 70 facilities.

Search terms: Test equipment, Surveys, Test facilities, Highway safety, Safety programs, Motor vehicle safety, Directories

AVAILABILITY: CFSTI as PB-180 326

HS-800 057 Fld. 5/0,2/0

TEST FACILITY INVENTORY FOR THE U. S. DEPARTMENT OF TRANSPORTATION. FINAL REPORT. VOL. 2
Wyle Labs.,
Huntsville, Ala.

31 Oct 1967 262p
Contract FH-11-6566
Report no. 54600-Vol. 2

Describes facilities useful in support of highway safety programs, having names beginning A-C. Gives general information on each facility, its size of staff, ownership, affiliation, test capabilities, willingness to participate in highway safety programs, whom to contact for more information.

Search terms: Test equipment, Surveys,

Test facilities,
Highway safety,
Safety programs,
Motor vehicle safety,
Directories

AVAILABILITY: CFSTI as PB-189 327

HS-800 058 Fld. 5/0,2/0

TEST FACILITY INVENTORY FOR THE U. S. DEPARTMENT OF TRANSPORTATION. FINAL REPORT VOL. 3
Wyle Labs.,
Huntsville, Ala.

31 Oct 1967 254p
Contract FH-11-6566
Report no. 54600-Vol. 3

Describes facilities useful in support of highway safety programs, having names beginning D-I. Gives general information on each facility, its size of staff, ownership, affiliation, test capabilities, willingness to participate in highway safety programs, whom to contact for more information.

Search terms: Test equipment, Surveys, Test facilities, Highway safety, Safety programs, Motor vehicle safety, Directories

AVAILABILITY: CFSTI as PB-189 328

HS-800 059 Fld. 5/0,2/0

TEST FACILITY INVENTORY FOR THE U. S. DEPARTMENT OF TRANSPORTATION. FINAL REPORT VOL. 4
Wyle Labs.,
Huntsville, Ala.

31 Oct 1967 234p
Contract FH-11-6566
Report no. 56400-Vol. 4

Describes facilities useful in support of highway safety programs, having names beginning J-R. Gives general information on each facility, its size of staff, ownership, affiliation, test capabilities, willingness to participate in highway safety

HS-800 056 Fld. 5/0,2/0

TEST FACILITY INVENTORY FOR THE U. S. DEPARTMENT OF TRANSPORTATION. FINAL REPORT VOL. 1
by John S. Anderson
Wyle Labs.,
Huntsville, Ala.

31 Oct 1967 240p
Contract FH-11-6566

2/0 Highway Safety (Cont.)

HS-800-059 (Cont.)

programs, whom to contact for more information.

Search terms: Test equipment, Surveys, Test facilities, Highway safety, Safety programs, Motor vehicle safety, Directories

AVAILABILITY: CFSTI as PB-180 329

HS-800 060 Fld. 5/0,2/0

TEST FACILITY INVENTORY FOR THE U. S. DEPARTMENT OF TRANSPORTATION. FINAL REPORT VOL. 5
Wyle Labs.,
Huntsville, Ala.

31 Oct 1967 256p
Contract FH-11-6566
Report no. 54600-Vol. 5

Describes facilities useful in support of highway safety programs, having names beginning S-Z. Gives general information on each facility, its size of staff, ownership affiliation, test capabilities, willingness to participate in highway safety programs, whom to contact for more information.

Search terms: Test equipment, Surveys, Test facilities, Highway Safety, Safety programs, Motor vehicle safety, Directories

AVAILABILITY: CFSTI as PB-180 330

HS-800 061 Fld. 5/0,2/0

TEST FACILITY INVENTORY FOR THE U. S. DEPARTMENT OF TRANSPORTATION. FINAL REPORT VOL. 6
Wyle Labs.,
Huntsville, Ala.

31 Oct 1967 80p
Contract FH-11-6566
Report no. 54600-Vol. 6

Describes non-applicable and non-responsive facilities. Lists those which either did not reply to questionnaire; had no applicable

facilities for highway safety, had their facilities already committed, or were not interested.

Search terms: Test equipment, Surveys, Test facilities, Highway safety, Safety programs, Motor vehicle safety, Directories

AVAILABILITY: CFSTI as PB-180 331

HS-800 062 Fld. 5/0,2/0

TEST FACILITY INVENTORY [FOR THE] U. S. DEPARTMENT OF TRANSPORTATION. FINAL REPORT. ADDENDUM 1
Wyle Labs.,
Huntsville, Ala.

31 Oct 1967 257p
Report no. 54600-1-Add.
Contract no. FH-11-6566

Purpose of addendum is to add to the inventory those organizations whose responses were received after the publication deadline of the original report. 65 additional organizations are inventoried. Gives general information on each facility, its size of staff, ownership, affiliation, test capabilities, willingness to participate in highway safety programs, whom to contact for more information.

Search terms: Test equipment, Surveys, Test facilities, Highway safety, Safety programs, Motor vehicle safety, Directories

AVAILABILITY: CFSTI as PB-180 332

HS-800 068 Fld. 5/0,2/0

TEST FACILITY INVENTORY [FOR THE] U. S. DEPARTMENT OF TRANSPORTATION. PROCEDURE
Wyle Labs.,
Huntsville, Ala.

31 Oct 1967 14p
Contract FH-11-6566
Report no. 54600-1-Proc.

Explains the data card system used in gathering information for survey of facilities, and how data was processed.

Search terms: Test equipment, Surveys, Test facilities, Highway safety, Safety programs, Data processing, Motor vehicle safety, Directories

AVAILABILITY: CFSTI as PB-180 333

HS-004 403 Fld. 2/0, 3/0

HIGHWAY SAFETY SAVES MEN AND MONEY
Anonymous

Published in Rural & Urban Roads v5 n12 p4,8,14 (Dec 1967)

Setting up a highway construction safety program at minimal cost, protecting work crews on high-speed expressways, proper job placement of the heart victim who is working, constructing a low-cost rotary mower guard and extinguishing an asphalt kettle fire were but a few of the life and money saving safety ideas which came out of the first Street, Road and Highway Division meeting of the National Safety Congress and Exposition.

Search terms: Highway safety, Safety programs, Construction, Personnel Work accidents, Accident prevention, Cost data, Conferences

HS-810 025 Fld. 2/0,5/0

[ACTIVITIES AND SOME FUTURE PLANS OF THE NHSB OF THE FHWA]

by Robert Brenner
National Highway Safety Bureau, Washington, D.C.

15 Jan 1968 41p
Presented at Highway Research Board TO-6 Committee (Highway Safety)

Describes programs of National Highway Safety Bureau, legislative background of highway safety

2/0 Highway Safety (Cont.)

HS-810-025 (Cont.)

efforts, development of safety standards, research being conducted by contractors for the Bureau.

Search terms: Highway safety, Legislation, National Highway Safety Bureau, Safety research, Safety standards

AVAILABILITY: NHSB

HS-810 026 Fld. 2/0

SOCIAL VALUE SYSTEMS, A BASIC RESEARCH NEED IN TRANSPORTATION AND SAFETY by Robert Brenner National Highway Safety Bureau, Washington, D. C.

6 Dec 1968 20p
Presented at the Conference on Mass Transportation for a Dynamic Society, Oakland Univ., Rochester, Mich.

Key issue in transportation safety research relates to social value systems. Decisions often involve value judgments, especially in master planning for public transportation, free-ways, land use. Safety costs are weighed against other costs and factors.

Search terms: Community support, Transportation planning, Safety programs, Sociological aspects, Engineering, Costs, Land use, Public transportation, Freeway planning, Regional planning

AVAILABILITY: NHSB

HS-810 027 Fld. 2/0,5/0

IMPLEMENTATION OF THE HIGHWAY SAFETY ACT OF 1966 by Robert Brenner National Highway Safety Bureau, Washington, D.C.

22 Oct 1968 13p
Presented at Public Works Congress, American Public

Works Association, Miami Beach, Fla.

Outlines progress being made in highway safety due to standards calling for energy-absorbing steering columns, laminated windshields, and safety belts. Comments on legislative progress in the control of drunken driving, licensing of driver training schools. Urges the establishment of safety program priorities to make best use of available funds where immediate gains are most likely as in traffic records, alcohol, motor vehicle registration.

Search terms: Highway safety, Energy absorption, Steering columns, Laminated glass, Windshields, Safety belts, Safety standards, Drinking drivers, Legislation, Driver education, Licensing, Safety programs, Cost data, Traffic records, Alcoholism, Motor vehicle registration, Emergency medical services, Police traffic services, Driver licensing, Accident location, Highway Safety Act of 1966, United States Government

AVAILABILITY: NHSB

HS-810 028 Fld. 2/0,5/0

FEDERAL GOVERNMENT PROGRESS IN EVALUATING HIGHWAY SAFETY PROGRAMS by Robert Brenner National Highway Safety Bureau, Washington, D.C.

28 Oct 1968 13p
Presented at National Safety Congress Traffic Session, National Safety Council, Chicago

Outlines progress being made in highway safety due to standards calling for energy-absorbing steering columns, laminated windshields, and safety belts. Comments on legislative progress in the control of drunken driving, licensing of driver training schools. Urges the establishment of safety program priorities to make best use of available funds where immediate gains

are most likely, as in traffic records, alcohol, motor vehicle registration, emergency medical services, police traffic services, driver licensing, and accident location problems. 65% of funds should go to these areas.

Search terms: Highway safety, Energy absorption, Steering columns, Laminated glass, Windshields, Safety belts, Safety standards, Drinking drivers, Legislation, Driver education, Safety programs, Cost data, Traffic records, Alcoholism, Motor vehicle registration, Emergency medical services, Police traffic services, Driver licensing, Accident location, Licensing, Highway Safety Act of 1966, United States Government

AVAILABILITY: NHSB

HS-810 029 Fld. 2/0

THE NATIONAL HIGHWAY SAFETY PROGRAM by Robert Brenner National Highway Safety Bureau, Washington, D. C.

16-17 Jan 1967 7p

Describes programs carried out under Highway Safety Act of 1966, many by state governments. Comments on the phases of accidents, the problem of defective vehicles, the setting of standards, the usefulness of insurance data to highway safety programs.

Search terms: Highway safety, Safety programs, Safety research, Highway Safety Act of 1966, Accident prevention, Post-crash phase, Crash phase, Pre-crash phase, Standards, Defective vehicles, Insurance industry, Motor vehicle safety, State government

AVAILABILITY: In Travelers Research Center, Inc., Hartford, Conn. TRAFFIC SAFETY: STRATEGIES FOR

2/0 Highway Safety (Cont.)

HS-810-029 (Cont.)

RESEARCH AND ACTION.
PROCEEDINGS OF A CON-
FERENCE HELD IN HARTFORD,
CONNECTICUT. p64-70

HS-810 030 Fld. 2/0

POLICY DEVELOPMENT FOR THE
NATIONAL HIGHWAY SAFETY
PROGRAM IN COMING YEARS
by Robert Brenner
National Highway Safety
Bureau, Washington, D. C.

25 Nov 1968 10p
Presented at National
Conference, Governors'
Highway Safety Represen-
tatives, New Orleans, La.

Outlines the progress since
1966 at state and federal
levels in highway safety.
Comments on future policy
decisions needing to be
made for training, demon-
strations, program planning,
decentralizing efforts into
the states, building
community support.

Search terms: Safety
programs, Highway
safety, Highway research,
Accident prevention,
State government,
Federal aid, Community
support

AVAILABILITY: NHSB

HS-810 031 Fld 2/0

THE EVOLVING ROLE OF THE
ENGINEERING PROFESSION IN
MOTOR VEHICLE SAFETY
by Robert Brenner
National Highway Safety
Bureau, Washington, D. C.

15 Jan 1969 17p
Presented at the
International Automotive
Engineering Congress &
Exposition, Society of
Automotive Engineers,
Detroit, Mich.

Industry and government
should cooperate to improve
vehicle safety performance,

exchanging information to
expand the fund of knowledge
upon which both must draw
to make decisions. Progress
since 1966 is outlined. The
idea that automotive engineer-
ing is monolithic is called
a myth. It is suggested that
the government's role should
be catalytic rather than
regulatory.

Search terms: Highway
safety, Motor vehicle
safety, Automotive
engineering, Federal
control, Automotive
industry, Motor vehicle
performance

AVAILABILITY: NHSB

HS-810 032 Fld. 2/0

TRAFFIC SAFETY AT THE
CROSS ROADS. REMARKS
by William Haddon, Jr.
National Highway Safety
Agency, Washington, D. C.

22 Sep 1966 10p
Presented at the Governor's
Traffic Safety Conference,
Denver, Colo.

New safety legislation is
both a result of and a con-
tributor to the changes
soon to take place. It is
essential that states,
communities and other groups
play a significant role in
defining common objectives.

Search terms: Highway
safety, Legislation,
Community support,
State government,
National Government,
Speeches

AVAILABILITY: corporate
author

HS-810 033 Fld. 2/0

REMARKS. [HIGHWAY SAFETY
STANDARDS]
by William Haddon, Jr.
National Highway Safety
Bureau, Washington, D. C.

29 Nov 1966 17p
Presented at the 51st
Annual Detroit Auto
Show, Detroit, Mich.

Corresponding to the three
phases of the highway

safety problem, standards
proposed under the National
Traffic and Motor Vehicle
Safety Act of 1966 are
outlined for comment.

Search terms: Highway
safety, Crash phases,
Standards, Legislation,
Speeches, National
Traffic and Motor
Vehicle Safety Act
of 1966

AVAILABILITY: From corporate
author

HS-810 034 Fld. 2/0

THE PRE-CRASH, CRASH AND
POST-CRASH PARTS OF THE
HIGHWAY SAFETY PROGRAM
by William Haddon, Jr.
National Highway Safety
Bureau, Washington, D. C.

20 Oct 1967 20p
Presented at the
American Bar Associa-
tion National Institute:
After Impact...The
Medical Story, Sponsored
by the Section of
Insurance, Negligence
and Compensation Law
of the American Bar
Association, with the
Cooperation of the
George Washington
University Medical
School, Mayflower Hotel,
Washington, D. C.

Emphasizes the importance
of a systematic approach
to highway loss prevention,
including specific attention
to the precrash, crash, and
post-crash parts of the
problem.

AVAILABILITY: From
corporate author

HS-810 035 Fld. 2/0

DANGER ON THE HIGHWAYS.
INTERVIEW WITH NATIONAL
SAFETY DIRECTOR
by William Haddon, Jr.
National Highway Safety
Bureau, Washington, D. C.

Published in U. S. News
and World Report, v63 n16
(16 Oct 1967)

Dr. Haddon answers questions

2/0 Highway Safety (Cont.)

HS-810-035 (Cont.)

on: the prospects for cutting highway casualties; alcohol and road risks; limits on speed; automated cars; highway safety standards, etc.

Search terms: Highway safety standards, Legislation, Alcoholic beverages, Automobile accidents, Drinking drivers, Interviews, National Highway Safety Bureau

HS-004 472 Fld. 2/0,4/1

HIGHWAY TRANSPORTATION LEGISLATION IN 1966 (A SUMMARY OF FEDERAL AND STATE ACTIVITY)

Anonymous
National Highway Users Conference, Washington, D.C.

[1967] 33p

Summarizes Federal and State legislation, uniform laws and motor vehicle regulations, Federal regulatory provisions, driver licensing and control, equipment requirements, etc.

Search terms: Highway transportation, Legislation, State government, United States Government, Highway safety, Mass transportation, Law uniformity, Safety belts, Safety standards, Motor vehicle safety, Tire safety, Taxes, Driver licensing, Financial responsibility, Speed limits, Traffic control devices, Air pollution control, Brakes (motion arresters), Lighting equipment, Mirrors, Safety inspection, Weight limits, Size limits

AVAILABILITY: From corporate author

HS-800 078 Fld. 2/0,5/0,1/3

UCLA MOTOR VEHICLE SAFETY PROJECT. FINAL REPORT
California Univ., Los Angeles.
Dept. of Engineering

Oct 1968 228p
Contract FH-11-6690
Report no. 68-52

Purpose of program was to collect and evaluate data on relationship between vehicle and equipment performance and traffic crashes and to develop systematic medico-engineering techniques and procedures for study of traffic injuries and fatalities in relation to design features of vehicle, highway, and other relevant factors. Work included establishing a method to reconstruct auto accidents, photoelastic studies, vehicle frame collapse mechanism, vehicle structural response, experimental collision engineering, study of head injuries, cardiovascular impacts, and mechanical characterization of human tissue.

Search terms: Crash research, Accident investigation, Fatalities, Motor vehicle design, Highway design, Accident simulation, Collisions (accidents), Head injuries, Heart injuries, Human factors engineering, Photoelastic studies, Collapse, Structural analysis, Engineering

AVAILABILITY: From CFSTI

HS-810 038 Fld. 2/0,5/0

[HIGHWAY SAFETY AND MOTOR VEHICLE LEGISLATION].

STATEMENT
by Robert Brenner
Department of Commerce,
Washington, D. C., Office
of the Undersecretary for
Transportation

31 Oct 1966 9p
Presented at the Washington
Council of Governments
meeting

Purposes of Highway Safety Act and National Traffic and Motor Vehicle Safety Act, both of 1966. Plans for motor vehicle safety performance standards, safety research, and safety programs on state and community level.

Search terms: Community support, Highway safety, Highway Safety Act of 1966, Law (jurisprudence), Motor vehicle performance, Motor vehicle safety, National Traffic and Motor Vehicle Safety Act of 1966, Safety programs, Safety research

AVAILABILITY: NHSB

HS-810 039 Fld. 2/0,5/0

[HIGHWAY SAFETY AND MOTOR VEHICLE LEGISLATION].
STATEMENT

by Robert Brenner
Department of Commerce,
Washington, D. C., Office
of the Undersecretary for
Transportation

9 Nov 1966 14p
Presented at the Motor
and Equipment Manufacturers
Assoc. meeting

Purposes of 1966 Highway Safety Act and National Traffic and Motor Vehicle Safety Act. Plans for motor vehicle safety performance standards and safety programs on state and community level.

Search terms: Community support, Highway safety, Highway Safety Act of 1966, Law (jurisprudence), Motor vehicle performance, Motor vehicle safety, National Traffic and Motor Vehicle Safety Act of 1966, Safety programs, Safety research

AVAILABILITY: NHSB

HS-810 040 Fld. 2/0,5/0

THE NEW NATIONAL HIGHWAY SAFETY PROGRAM
by Robert Brenner
National Highway Safety
Bureau, Washington, D. C.

5 Jun 1967 25p
Presented by Bradford M.
Crittenden at the Eastern
Oil Industry TBA Group,
Lancaster, Pa.

Programs carried out under the National Traffic and Motor Vehicle Safety Act and Highway Safety Act,

2/0 Highway Safety (Cont.)

HS-810-040 (Cont.)

both of 1966. Standards, research, safety. Work of National Highway Safety Bureau, including cooperation with Bureau of Standards and auto industry.

Search terms: Automotive industry, Highway research, Highway safety, Highway Safety Act of 1966, Highway standards, Motor vehicle safety, National Highway Safety Bureau, National Traffic and Motor Vehicle Safety Act of 1966, Safety programs, Safety research, Safety standards, Standards

AVAILABILITY: NHSB

HS-810 041 Fld. 2/0,5/0

THE NEW NATIONAL HIGHWAY SAFETY PROGRAM

by Robert Brenner
National Highway Safety Bureau, Washington, D. C.

1 Jul 1967 25p
Presented at the Independent Garage Owners of America National Convention, Pittsburgh, Pa.

Programs carried out under the National Traffic and Motor Vehicle Safety Act and Highway Safety Act, both of 1966. Standards, research, safety. Work of National Highway Safety Bureau.

Search terms: Highway research, Highway safety, Highway Safety Act of 1966, Highway standards, Motor vehicle safety, National Highway Safety Bureau, National Traffic and Motor Vehicle Safety Act of 1966, Safety programs, Safety research, Standards

AVAILABILITY: NHSB

HS-810 042 Fld. 2/0,5/0

THE ORGANIZATION AND PROGRAM STRUCTURE OF THE NATIONAL

HIGHWAY SAFETY BUREAU
by Robert Brenner
National Highway Safety Bureau, Washington, D. C.

13 Oct 1967 13p
Presented at the 1st Annual FHWA Meeting, Salt Lake City, Utah

To improve safety performance standards of cars and equipment; assure safety of cars in use; help state and local governments with their safety programs; improve accident investigation data analysis.

Search terms: Accident data, Accident investigation, Data processing, Federal control, Local government, Motor vehicle performance, Motor vehicle safety, National Highway Safety Bureau, Safety programs, Safety standards, State government

AVAILABILITY: NHSB

HS-810 045 Fld. 2/0,1/0

[HIGHWAY SAFETY]
by William Haddon, Jr.
National Highway Safety Bureau, Washington, D.C.

28 Nov 1967 13p
Presented at the Annual Convention, Association of Minnesota Counties, Minneapolis

"On an average day, year in and year out, the highway casualties in the United States total over 10,000 injured." The circumstances surrounding the crash phases--precrash, crash, postcrash--are related to the seriousness of the problem and the roles played by the National Traffic and Motor Vehicle Safety Act and the Highway Safety Act of 1966.

Search terms: Meetings, Speeches, Conferences, Traffic accidents, Crash phase, Highway safety, Legislation, Safety laws

AVAILABILITY: From NHSB

HS-810 046 Fld. 2/0

[HIGHWAY SAFETY]

by William Haddon, Jr.
National Highway Safety Bureau, Washington, D.C.

8 Mar 1968 6p
Presented at the 47th Annual Mass. Safety Conference, Boston

Alcoholism, teenagers, the elderly--as facets of the highway safety problem should be considered not in isolation but in close relationship with other human problems.

Search terms: Speeches, Conferences, Meetings, Highway safety, Social reforms, Community support

AVAILABILITY: From NHSB

HS-810 047 Fld. 2/0

[HIGHWAY SAFETY]
by William Haddon, Jr.
National Highway Safety Bureau, Washington, D.C.

21 Mar 1968 5p
Presented at the Rotary Club Luncheon, Houston, Texas

Emphasizes the need to view the problems of highway safety (alcoholics, teenagers, elderly), not as matters in isolation from the rest of human affairs, but as having such close relationships with other contemporary issues, that they can be dealt with in a much broader context than has usually been the case.

Search terms: Speeches, Conferences, Meetings, Highway safety, Social reforms, Community support

AVAILABILITY: From NHSB

HS-810 048 Fld. 2/0

THE INDIVIDUAL AND THE QUALITY OF HIS ENVIRONMENT
by William Haddon, Jr.
National Highway Safety Bureau, Washington, D.C.

27 Jun 1968 10p
Presented at the Annual Traffic Safety Management Workshop, American Auto-

2/0 Highway Safety (Cont.)

HS-810-048 (Cont.)

mobile Association, Washington, D.C.

Considers the highway safety problem--crash phases, fatalities and injuries, and results due to better crash design or restraint systems. Emphasizes the importance under the Highway Safety Act of the Governors' role in authorizing and co-ordinating state grant-in-aid activities.

Search terms: Speeches, Conferences, Meetings, Highway Safety Act of 1966, State government, Legislation, Standards, Safety laws

AVAILABILITY: From NHSB

HS-004 572 Fld. 1/3,2/0,5/0

THE SAFETY PROBLEM

by William Haddon, Jr.
New York (State). Dept.
of Health, Albany

28 Apr 1966 12p

Presented at the Symposium "Traffic Safety-A National Problem", 2nd Annual Meeting of the National Academy of Engineering, Washington, D.C.

This presents a conceptual framework for approaching highway safety problems, emphasizing the pre-crash, crash and post-crash portions of the problem.

Search terms: Highway safety, Injury prevention, Automobile design, Passenger compartment, Crash phase, Speeches*

AVAILABILITY: Reference use only in NHS Documentation Center. No copies available for distribution

HS-004 575 Fld. 1/3,2/0,5/0

THE SYSTEMS APPROACH. A TOOL FOR REDUCING VEHICLE/HIGHWAY ACCIDENTS
by William H. Forster

Published in Archives of Environmental Health
v13 p537-42 (Oct 1966) 5ref
Presented at the AMA
Congress on Environmental
Health Problems, 4-5 Apr
1966, Chicago

Systems engineering, the organized approach to modeling--structuring, analyzing and designing the overall system--could have significant impact on accident prevention. Three ways are detailed, the most important begin a better understanding of the system of the physical and psychological laws which govern the system. The physician's role in speeding up the overall structuring is briefly outlined.

Search terms: Systems engineering, Accident reduction, Highway safety, Decision making, Probability*, Models

HS-004 577 Fld. 2/0,4/1

BASE YEAR HIGHWAY SAFETY EXPENDITURES AND COST ESTIMATES FOR IMPLEMENTING THE HIGHWAY SAFETY ACT OF 1966 IN VIRGINIA

by Ira F. Doom,
Wayne S. Ferguson,
L. Ellis Walton,
Charles Meachum,
Dave Greenberg
Virginia. Highway
Research Council, Charlottesville

Nov 1967 161p

This study includes: 1) a determination of the amount of State and local expenditures for highway safety in Virginia, and 2) an estimate of costs for fiscal years 1967-1976. Basic approach of the study was: an examination of each of the Safety Standards; a legal analysis of Virginia's compliance; a compilation of areas in which Virginia is not meeting Federal Safety Standards.

Search terms: Highway Safety Act of 1966*, Virginia*, Highway safety, Cost data, Expenses, State

Government, Safety standards, Compliance procedures

AVAILABILITY: From corporate author

HS-004 654 Fld. 4/1,2/0

RULES OF THE ROAD--REVISED, 1968

National Committee on Uniform Traffic Laws and Ordinances, Washington, D.C.

Published in Traffic Laws Commentary n68-1 pl-44
(31 Oct 1968)

Explains rules and their revisions on following: turning on red light, right of way in intersections and for pedestrians on sidewalks, pedestrian rules, basic speed rule, rules for motorcycles, and miscellaneous revisions dealing with accidents involving unattended property, reversible one-way traffic, restrictions on use of controlled-access highways, racing on highways, chemical test for blood alcohol, eluding police, and authority to remove vehicles. Text of the rules is included.

Search terms: Turning (direction change), Intersections, Pedestrians, Traffic signals, Motorcycles, Speed, One way streets, Controlled access highways, Access control, Right-of-way (traffic rules)*, Accident factors, Reckless driving, Blood alcohol levels*, Police chase*, Police traffic services, Regulations, Traffic laws

HS-810 049 Fld. 2/0,3/0,5/0

AUTOMOTIVE ENGINEERING EFFECTIVENESS IN STATE-COMMUNITY HIGHWAY SAFETY PROGRAMS
by Bradford M. Crittenden
National Highway Safety Bureau, Washington, D.C.
Highway Safety Programs

2/0 Highway Safety (Cont.)

HS-810-049 (Cont.)

Service

15 Jan 1969 13p

Presented at the International Automotive Engineering Congress and Exposition, Detroit, Mich.

Stresses the inseparability of components of highway safety and the need for cooperative effort. Extends the safety triad of vehicle-highway-driver to include passenger-pedestrian relating Highway Safety performance standards to alcohol and pedestrian safety.

Search terms: Automotive design, Safety standards, Speeches*, Highway safety, Alcoholic beverages, Crash phase, Pedestrian safety, Drinking drivers

AVAILABILITY: From corporate author

HS-810 050 Fld. 3/4,2/0

[HIGHWAY SAFETY]

by William Haddon, Jr.
National Highway Safety Bureau, Washington, D.C.

19 Mar 1968 9p

Presented at the Automobile Insurance Industry Second Annual Traffic Safety Research Symposium, Northbrook, Ill.
(See, also, HS-004 638)

Problems of highway safety (alcoholism, teenagers, the elderly) should not be considered as matters in isolation from other human problems, but as having close relationships with other contemporary issues so they can be dealt with in a much broader context.

HS-004 685 Fld. 2/0,5/0

A BROAD VIEW TO SAFETY
Anonymous

Published in National Safety News v98 n6 p38-43 (Dec 1968)

A report on the 1968 National Safety Congress. Among the subjects presented were air pollution, federal and state controls for safety, traffic problems, vehicle design, product liability, emergency planning, legal responsibility in safety inspection.

Search terms: Safety, Air pollution, Federal control, Traffic, Motor vehicle design, Legal responsibility, Motor vehicle inspection, Emergency services, Conferences*

Search terms: Conferences*, Highway safety, Social reforms*, Community support

AVAILABILITY: From NHSB

HS-004 686 Fld. 2/0,3/1

FOCUS ON COUNTIES
by Warren P. Knowles

Published in Traffic Safety v69 n1 p8-9,38 (Jan 1969)

The governor of Wisconsin tells how his state used the National Safety Council's Highway Safety Program Analysis to study county traffic operations. The need for an implied consent law at county level is also discussed.

Search terms: Rural areas, Drinking drivers, Safety programs, Blood alcohol levels*, National Safety Council*, Local government*, Wisconsin*, State government, Alcoholism

HS-004 745 Fld. 2/0

MAKING HIGHWAY SAFETY PRACTICAL
by Louis J. Horn

Published in Public Works v99 n12 p62-4 (Dec 1968)

Briefly describes some of the research projects conducted by the Texas Transportation Institute at its test track facility.

Search terms: Texas Transportation Inst.*, Safety research, Skid resistance tests, Poles (supports), Breakaway bases*, Railroad grade crossings, Highway lighting

HS-004 746 Fld. 2/0,4/5

WORLD SURVEY OF CURRENT RESEARCH AND DEVELOPMENT ON ROADS AND ROAD TRANSPORT, 1968. A REPORT COVERING AN INVENTORY OF 40 COUNTRIES
International Road Federation, Washington, D. C.

Dec 1968 537p

Contract FH-11-6744

Continues the survey work performed under contract CPR-11-2655

Updates a continuing international survey of current highway research by noting progress for new and old projects. Of the total research, 6.5% represents highway safety.

Search terms: Highway research, Highway safety, Foreign countries*, Safety research, Surveys, Information systems, Highway Research Information Service*, International Road Research Documentation*

AVAILABILITY: From corporate author (Includes HS-004 747 to HS-004 749)

HS-004 747 Fld. 2/0,

NON-DESTRUCTIVE TESTING IN RELATION TO HIGHWAYS
by Ronald Jones
International Union of Testing and Research Labs. for Materials and Structures (RILEM)

Twenty countries (excluding the United States and the United Kingdom) supplied information on nondestructive detection methods: (1) seismic, pulse, vibration; (2) radioactive materials; (3) electric or magnetic methods; (4) road surface deflection.

Search terms: Inspection

2/0 Highway Safety (Cont.)

HS-004-747 (Cont.)

procedures, Nondestructive testing*, Soil tests, Highway design, Foreign countries*, Highway standards

AVAILABILITY: In International Road Federation, Washington, D. C. WORLD SURVEY OF CURRENT RESEARCH AND DEVELOPMENT ON ROADS AND ROAD TRANSPORT, 1968, p468-82 (HS-004 746)

HS-004 748 Fld. 2/0

STREET AND MOTORWAY LIGHTING IN EUROPE. CASE STUDY NO. 2, MOTORWAY LIGHTING by Granville Berry

Problem of lighting motorways is becoming more acute as night accidents continue to rise and road traffic increases. Lighting systems, maintenance of lamps, economic justification in some European countries is briefly discussed.

Search terms: Night driving, Lighting design, Illuminating, Foreign countries*, Accident prevention, Safety measures

AVAILABILITY: In International Road Federation, Washington, D. C. WORLD SURVEY OF CURRENT RESEARCH AND DEVELOPMENT ON ROADS AND ROAD TRANSPORT, 1968, p491-3 (HS-004 746)

HS-004 749 Fld. 2/0

TECHNIQUES FOR PRODUCING PERSPECTIVE VIEWS WITH COMPUTER AND ELECTRONIC PLOTTER by Gunnar Pellikka, Herbert Nordin Sweden. National Swedish Road Administration

Development of data-processing and automatic line-plotting in computing perspective can replace laborious

manual graphic methods as aids in road design.

Search terms: Computers, Automatic line-plotting*, Highway design, Perspective*, Three dimensional displays*

AVAILABILITY: In International Road Federation, Washington, D. C. WORLD SURVEY OF CURRENT RESEARCH AND DEVELOPMENT ON ROADS AND ROAD TRANSPORT, 1968, p497-503 (HS-004 746)

HS-810 055 Fld. 2/0,3/0,5/0

DEPARTMENT OF TRANSPORTATION INTRA-DEPARTMENTAL SAFETY SEMINAR (1ST). PROCEEDINGS Department of Transportation, Washington, D. C.

Jan 1969 256p
Seminar held 16-17 Dec 1968

Purpose of seminar was to interchange ideas among program managers of Coast Guard, Federal Aviation Administration, Federal Highway Administration, and Federal Railroad Administration, concerned with similar aspects of the safety field. Papers are grouped under four general topics: route and terminal safety, vehicle safety, the safe vehicle operator, and protection and care of the vehicle occupant.

Search terms: Occupant protection, Safety programs, Highway safety, Motor vehicle safety, Driver characteristics

AVAILABILITY: From corporate author (Includes HS-810 056 to HS-810 059)

HS-810 056 Fld. 2/0

ROUTE AND TERMINAL SAFETY (HIGHWAY) by James D. Lacy Bureau of Public Roads, Washington, D. C. Office of Traffic Operations

Discusses various means of accident prevention: traffic

limitation through spacing controls; safer highway design to prevent hazardous occurrences; better highway lighting, lane marking, signs and other guidance devices; use of controlled access freeways. Includes federal-state cooperation in highway safety field.

Search terms: United State Government, Accident prevention, Highway design, Traffic control devices, Highway safety, Lane lines*, Signs (displays), Controlled access highways, Freeways, Traffic density, State government, Federal-state relationships*, Hazards

AVAILABILITY: In DEPARTMENT OF TRANSPORTATION INTRA-DEPARTMENTAL SAFETY SEMINAR (1ST). PROCEEDINGS, p31-43 (HS-810 055)

HS-810 057 Fld. 2/0,5/0,1/0

VEHICLE SAFETY (HIGHWAY) by William Haddon, Jr. National Highway Safety Bureau, Washington, D. C.

Outlines the problems and progress made in the highway safety field. Among the problems discussed are pedestrian and motorcycle safety, the better packaging of passengers, better steering wheels, windshields, and emergency medical services. Problems are divided into pre-crash, crash, and post-crash phases.

Search terms: Highway safety, Passenger packaging, Crash research, Windshields, Steering wheels, Pre-crash phase, Crash phase, Post-crash phase, Motorcycle safety, Pedestrian safety, Emergency medical services

AVAILABILITY: In DEPARTMENT OF TRANSPORTATION INTRA-DEPARTMENTAL SAFETY SEMINAR (1ST). PROCEEDINGS, p99-118 (HS-810 055)

2/0 Highway Safety (Cont.)

HS-810 058 Fld. 2/0,3/0

THE SAFE VEHICLE OPERATOR (HIGHWAY)

by Robert Brenner
National Highway Safety
Bureau, Washington, D. C.

Discusses the role of the driver in accidents. Includes problems of the driver's physical and mental fitness, drinking patterns, attitudes, driver education, licensing, improvement courses for offenders, and other accident factors. Urges research on many of these problems and the use of driving simulation equipment.

Search terms: Driver characteristics, Driving simulation, Accident factors, Driving tasks, Driver attitudes, Driver licensing, Driver education, Driver improvement, Driver physical fitness, Drinking drivers, Driver records, Commercial driver training, Driver intoxication, Blood alcohol levels*, Fatalities, Drugs, Handicapped drivers

AVAILABILITY: In DEPARTMENT OF TRANSPORTATION INTRA-DEPARTMENTAL SAFETY SEMINAR (1ST). PROCEEDINGS, p165-94 (HS-810 055)

HS-810 059 Fld. 2/0,5/14

PROTECTION AND CARE OF THE VEHICLE OCCUPANT (HIGHWAY)

by Robert Brenner
National Highway Safety
Bureau, Washington, D. C.

Discusses occupant protection, including restraint systems, means of energy absorption, development of airbag restraints. Protection from head on, rear end, side impact, and secondary collisions is necessary. Research on injuries indicates what types of protection are needed.

Search terms: Restraint systems, Energy absorp-

tion, Head on collisions, Rear end collisions, Secondary collisions, Side impact collisions, Airbag restraints*, Injury research, Deceleration, Occupant protection*, Pedestrian safety

AVAILABILITY: In DEPARTMENT OF TRANSPORTATION INTRA-DEPARTMENTAL SAFETY SEMINAR (1ST). PROCEEDINGS, p233-41 (HS-810 055)

HS-004 808 Fld. 2/0

NATIONAL HIGHWAY SAFETY

by Alan S. Boyd
Department of Transportation,
Washington, D. C.

Published in The Police Chief v35 n12 p41-3 (Dec 1968)

Various aspects of the highway safety program (standards, the National Driver Register, downtown traffic congestion, etc.,) are related to local needs and state cooperation. Now a broad re-examination of our transport system seems necessary.

Search terms: Highway safety, Federal aid, State government, Safety standards, Transportation planning

HS-004 831 Fld. 4/1,2/0

THE COMMISSIONER FOR MOTOR TRANSPORT, NEW SOUTH WALES. ANNUAL REPORT FOR YEAR ENDING THIRTIETH JUNE, 1967. New South Wales. Dept. of Motor Transport, Sydney (Australia)

4 Dec 1967 80p

Includes statistics concerning vehicle registrations, traffic facilities, road accidents. Summarizes activities of the New South Wales Dept. of Motor Transport in: legislation, road safety, driver licensing. Presents charts on accidents and casualties (fatalities and non-fatalities).

Search terms: Australia*, Statistics, Traffic accidents, Legislation, Highway

safety, Fatalities, Injuries, Motor vehicle registration, Driver licensing

AVAILABILITY: From corporate author

HS-004 928 Fld. 2/0,4/0

COLLEGES AND UNIVERSITIES HIGHWAY TRAFFIC AND SAFETY CENTERS

by James E. Aaron, ed.,
Dale O. Ritzel, ed.
National Safety Council,
Chicago, Ill. and Southern
Illinois Univ., Carbondale

1968 51p
Report no. Mono-24

Two articles describe the organization and outlook of university safety centers. Objectives, programs, staff composition, student composition, sponsorship for 16 college and university highway traffic centers are surveyed.

Search terms: Traffic safety programs, Universities, Centers

AVAILABILITY: From corporate author (Includes HS-004 929 to HS-004 930)

HS-004 929 Fld. 2/0,4/0

ORGANIZING THE UNIVERSITY SAFETY CENTER

by James E. Aaron
Southern Illinois Univ.,
Carbondale. Dept. of
Health Education

Administrative alignment, financing, programming (3 areas are considered: academic, service, research), and staffing the university safety education center are explained.

Search terms: Management, Traffic safety programs, Universities, Financing, Personnel

AVAILABILITY: In National Safety Council. COLLEGES AND UNIVERSITIES HIGHWAY TRAFFIC AND SAFETY CENTERS, 1968, pl-5 (HS-004 928)

2/0 Highway Safety (Cont.)

HS-004 930 Fld. 2/0,4/0

OUTLOOK: THE GROWTH AND ROLE OF CENTERS IN THE DECADE AHEAD

by Gordon H. Sheehe
Michigan State Univ., East
Lansing. Highway Traffic
Safety Center

The overriding objective of the university traffic safety center is to help provide safer and more efficient motor vehicle travel through 5 major activity types: education, training, special studies, advising the technical community, providing information and materials.

Search terms: Traffic safety programs, Universities

AVAILABILITY: In National Safety Council. COLLEGES AND UNIVERSITIES HIGHWAY TRAFFIC AND SAFETY CENTERS, 1968, p6-13 (HS-004 928)

HS-004 931 Fld. 2/0

A FACT-GATHERING GUIDE TO ASSIST STATES IN DEVELOPING A HIGHWAY SAFETY PROGRAM
Automotive Safety Foundation, Washington, D. C.

1968 178p 91 refs

Purpose of guide is to assist states to comply with Highway Safety Act of 1966. Guide covers accident records and research; driver education and licensing; emergency medical services; highway design, construction, and maintenance; laws and ordinances; motor vehicle registration and titling; periodic motor vehicle inspection; police traffic services; public information and public support; traffic courts; and traffic operations. These are discussed in relation to the federal safety standards.

Search terms: Safety Programs, Highway Safety Act of 1966*, Safety standards, State government, Compliance procedures, Acci-

dent records, Accident research, Driver education, Driver licensing, Emergency medical services, Highway design, Highway safety, Highway construction, Highway maintenance, Legislation, Motor vehicle registration, Motor vehicle ownership, Motor vehicle inspection, Police traffic services, Public opinion, Community support, Traffic planning

AVAILABILITY: From corporate author

HS-005 016 Fld. 2/0,5/0,3/0

DIMENSIONS OF THE TRAFFIC SAFETY PROBLEM

by Murray Blumenthal

Published in Traffic Safety Research Review v12 n1 p7-12 (Mar 1968) 24 refs

Presented at Automotive Engineering Congress, Detroit, Mich., 9-13 Jan 1967.

Traffic safety is described as a problem with technological, behavioral, sociological, and value dimensions. Accidents are viewed as "localized system failures" symptomatic of an underlying problem that includes: an imbalance between driver capability and demand; lack of recognition of trade-offs between safety and other desired outputs.

Search terms: Systems analysis, Traffic safety, Sociological aspects, Human behavior, Traffic accidents, Accident causes, Driver performance, Driver-vehicle interface, Motor vehicle design

HS-005 030 Fld. 4/2,2/0

THE ROLE OF THE COMMUNITY COLLEGE IN DEVELOPING TRAFFIC SPECIALISTS AND TECHNICIANS
by Richard Bishop, Gordon Sheehe
American Assoc. of Junior Colleges, Washington, D. C.

1968 40p 36 refs

Manpower demands in traffic technician career fields are increasing rapidly as the impact of the Highway Safety Act becomes evident. The contribution which can be made by community colleges considers the following areas: motor vehicle administration, traffic engineering, police traffic services, driver and traffic safety education, and commercial highway transportation.

Search terms: Education, Universities, Community support, Schools, Manpower utilization*, Highway safety, Police traffic services, Traffic administration, Traffic engineering, Driver education, Curricula*

AVAILABILITY: From corporate author \$1.50

HS-005 101 Fld. 2/0

MEMORANDUM REPORT [ON THE MILLIONS THE AUTOMOBILE MANUFACTURERS ASSOCIATION IS INVESTING IN SAFETY RE- SEARCH]

Anonymous

Published in *Automotive Information* v6 n4 p4-5 (Jan 1969)

Outlines the research being done on accidents, crash and impact studies, highway safety, safer motor vehicle design.

Search terms: Highway safety, Accident research, Safety research, Crash research, Impact studies, Safety design, Motor vehicle design, Automobile Manufacturers Assoc.*

HS-005 144 Fld. 2/0

FEDERAL LAW AND HIGHWAY SAFETY

by Sherwood K. Booth

Published in *American Road Builder* v44 n2 p4-7 (Feb 1967)

With passage of the 1966 Highway Safety Act and the National Traffic and Motor Vehicle Safety Act, the Federal role in highway safety is assured. Safety standards for motor vehicles are established, and states are

2/0 Highway Safety (Cont.)

HS-005-144 (Cont.)

required to establish highway safety programs.

Search terms: Highway safety; State government; Safety standards; Motor vehicle safety; Safety programs; Highway Safety Act of 1966*; National Traffic and Motor Vehicle Safety Act of 1966*

HS-005 205 Fld. 2/0; 5/0

POLICY ON ROAD SAFETY

Australian Medical Assoc., Glebe, N.S.W. (Australia)

Nov 1968 12p

The road safety problem in Australia is attacked through a series of recommendations by its medical association on: road design, vehicle design, inspection, accident reporting, insurance, emergency services, driver education and licensing, implied consent laws, and accident prevention.

Search terms: Implied consent laws*; Highway safety; Australia*; Accident prevention; Community support; Physicians*; Safety programs; Driver licensing; Driver education; Highway design; Automobile design; Motor vehicle inspection; Accident reports; Insurance; Drinking drivers; Driver intoxication; Emergency medical services

AVAILABILITY: From corporate author

HS-800 138 Fld. 3/5; 2/0

THE MISSION, OBJECTIVES, ORGANIZATION, AND PROGRAMS OF THE NATIONAL HIGHWAY SAFETY BUREAU

by William E. Tarrants

National Highway Safety Bureau, Washington, D.C. National Highway Safety Inst.

Discusses the Highway Safety Act and National Traffic and Motor Vehicle Safety Act, the establishment of safety standards, the research carried on by the bureau and its con-

tractors on many aspects of the highway safety problem.

Search terms: National Highway Safety Bureau*; Highway safety; Highway Safety Act of 1966*; Safety standards; Safety programs

AVAILABILITY: In Inst. for Educational Development. PROC. NATL. DRIVER EDUCATION AND TRAINING SYMPOSIA, 1969, p195-235 (HS-800 119)

HS-005 263 Fld. 2/0

NEEDED: \$958 MILLION MORE FOR TRAFFIC SAFETY

by Russell I. Brown

Published in *Traffic Engineering* v36 n5 p21-4 (Feb 1966)

The author, president of the Insurance Institute for Highway Safety, suggests that state and local governments should double their current traffic safety expenditures and increase their traffic engineering funds by \$321 million. Because of accidents and congestion, the nation is not getting its money's worth from its investment in highway transportation.

Search terms: Highway safety; Costs*; Traffic engineering; State government*; Local government*; Traffic congestion; Accidents; Highway transportation

HS-810 068 Fld. 5/22; 2/0

TIRE SAFETY AND THE NEW NATIONAL HIGHWAY SAFETY PROGRAM

by Robert Brenner

National Highway Safety Bureau, Washington, D.C.

27 Sep 1967 19p

Remarks prepared for delivery before the 47th Annual Convention, National Tire Dealers and Retreaders Assoc., San Francisco, Calif.

Explains the National Traffic and Motor Vehicle Safety Act and the Highway Safety Act of 1966, the establishment of safety standards, and their relation to used car safety, tire safety, and motor vehicle inspection. Standards for retreaded tires are outlined and the need for consumer education is pointed out.

Search terms: National Traffic and Motor Vehicle Safety Act of 1966*; Highway Safety Act of 1966*; Safety standards; Used cars*; Motor vehicle inspection; Tire safety; Consumer education*; Retreads

AVAILABILITY: NHSB

HS-810 069 Fld. 2/0; 4/2

REMARKS OF BRADFORD M. CRITTENDEN [ON THE STATE AND COMMUNITY HIGHWAY SAFETY PROGRAM]

by Bradford M. Crittenden

National Highway Safety Bureau, Washington, D.C. Highway Safety Programs Service

27 Nov 1967 20p

Presented to the Conference of Women Community Leaders for Highway Safety, Washington, D.C.

Discusses the work of the National Highway Safety Bureau, especially in relation to state and community highway safety programs. The safety standards are outlined and their relation to state programs discussed. The bureau will continue to work with the states to improve their highway safety programs and help them meet the standards.

Search terms: National Highway Safety Bureau*; Highway safety; Safety programs; State government; Community support; Compliance procedures; Local government*; Safety standards

AVAILABILITY: NHSB

HS-810 072 Fld. 5/0; 2/0

AUTOMOTIVE SAFETY AND THE ENGINEERING MATERIALS SCIENCES

by Robert Brenner

National Highway Safety Bureau, Washington, D.C.

6 Feb 1969 22p

Remarks prepared for delivery before the Society of Plastics Industry, Inc., 24th Conference and Exhibit, Washington, D.C. Accomplishments since passage of the National Traffic and Motor Vehicle Safety Act and Highway Safety Act of 1966 are outlined. A three-phase

2/0 Highway Safety (Cont.)

HS-810-072 (Cont.)

sequence has been adopted for working on the accident problem: the pre-crash phase, the crash phase, and the post-crash phase. The uses of plastics, nylons and other materials for safer equipment are discussed.

Search terms: National Traffic and Motor Vehicle Safety Act of 1966*; Highway Safety Act of 1966*; Plastics; Nylon*; Highway safety; Motor vehicle equipment; Pre-crash phase; Post-crash phase; Crash phase; Accident research; Safety design; Automobile design

AVAILABILITY: NHSB

HS-810 073 Fld. 2/0; 5/0

REMARKS BY BRADFORD M. CRITTENDEN ON THE FEDERAL ASPECT OF THE NATIONAL EFFORT TO IMPROVE HIGHWAY SAFETY

by Bradford M. Crittenden

National Highway Safety Bureau, Washington, D.C., Highway Safety Program Service

4 Feb 1969 19p

Remarks before the National Extension Homemakers' Council Leadership Conference on Highway Safety, Michigan State Univ., East Lansing.

Discusses the work of the National Highway Safety Bureau. Outlines programs connected with the pre-crash, crash, and post-crash phases of accidents; the safety standards and performance standards; and projections for highway safety improvements which should result from the safety programs.

Search terms: National Highway Safety Bureau*; Highway safety; Safety programs; Safety standards; Performance characteristics; Pre-crash phase; Post-crash phase; Crash phase; Accident research

AVAILABILITY: NHSB

HS-810 076 Fld. 2/0

IMPLEMENTATION OF HIGHWAY SAFETY RESEARCH

by Bradford M. Crittenden

National Highway Safety Bureau, Washington, D.C. Highway Safety Program Service

28 Jan 1969 8p

Remarks at a Panel Session of the Third Highway Safety Research Conference, Chicago, Ill.

Discusses the role of the National Highway Safety Bureau in carrying out the provisions of the Highway Safety Act and the National Traffic and Motor Vehicle Safety Act of 1966. The prime objectives are the generation of a scientific data base to support safety standards and the giving of technical assistance to states, communities, and organizations connected with highway safety. The motorcycle safety program is discussed as an example of what can be accomplished. Further research needs are outlined.

Search terms: National Highway Safety Bureau*; Highway Safety Act of 1966*; National Traffic and Motor Vehicle Safety Act of 1966*; Safety standards; Community support; State government; Highway safety; Motorcycle safety; Safety programs

AVAILABILITY: NHSB

HS-810 077 Fld. 2/0

TESTIMONY BEFORE THE COMMITTEE ON COMMERCE OF THE UNITED STATES SENATE

by F. C. Turner

Federal Highway Administration, Washington, D.C.

14 Apr 1969 19p

Concerned with hearings on S.1245—To authorize appropriations for the fiscal years 1970 and 1971 for the purpose of carrying out the provisions of the National Traffic and Motor Vehicle Safety Act of 1966, and to amend the definition of "motor vehicle equipment" in that Act.

Traffic safety accomplishments are presented in three areas of fatality reduction: high penetration resistant windshields, energy absorbing steering columns, and safety belts. A section by section analysis of a proposed "National Traffic and Motor Vehicle Safety Act of 1969" is included.

Search terms: Safety laws; Traffic safety; Windshields; Energy absorption; Steering columns; Seat belts; National Traffic and Motor Vehicle Safety Act of 1966*; Safety standards; Fatalities; Motor vehicle equipment; Appropriations*; Costs*

AVAILABILITY: Corporate author

HS-810 078 Fld. 4/2; 2/0

REMARKS AT THE AWARDS LUNCHEON OF THE AMERICAN TRUCKING ASSOCIATION'S NEWSPAPER SAFETY WRITING COMPETITION, WASHINGTON, D.C.

by F. C. Turner

Federal Highway Administration, Washington, D.C.

17 Apr 1969 7p

The importance of an accurately informed public to an effective highway safety program is stressed. Awards for the 14th Annual Newspaper Safety Writing Competition were presented for highway safety items in several categories.

Search terms: Community support; Public opinion; Safety programs; Highway safety; Safety propaganda

AVAILABILITY: Corporate author

HS-810 079 Fld. 2/0

TESTIMONY ON PENDING MATTERS RELATING TO THE HIGHWAY SAFETY PROGRAMS

by Robert Brenner

National Highway Safety Bureau, Washington, D.C.

22 May 1969 37p

Prepared for delivery before the Subcommittee on Roads of the House Committee on Public Works.

Outlines the National Highway Safety Bureau's role in carrying out provisions of the Highway Safety Act of 1966. Discusses the effectiveness of seat belts, motorcycle safety programs, drinking driver control, emergency medical services, driver education, accident investigation, the National Driver Register, and other aspects of the highway safety program.

Search terms: Highway Safety Act

2/0 Highway Safety (Cont.)

HS-810-079 (Cont.)

of 1966*; National Highway Safety Bureau*; Safety standards; Safety programs; Drinking drivers; Driver education; Accident prevention; Unsafe speed; Emergency medical services; State government; Federal aid; Seat belts*; Motorcycle safety; Driver intoxication; Accident investigation; National Driver Register*; Highway safety

AVAILABILITY: NHSB

HS-005 385 Fld. 2/0

SAFETY AND SYSTEMS ANALYSIS, WITH APPLICATIONS TO TRAFFIC SAFETY

by David M. Boodman

Little (Arthur D.), Inc., Cambridge, Mass.

Published in *Law and Contemporary Problems* v33 n3 p488-511 (Summer 1968) 14 refs

Accidents are a manifestation of systems failure. The systems analysis approach to the traffic safety problem requires consideration of a variety of programs intended to reduce the hazards as they exist in the vehicle, the driver, the environment, or the legal and regulatory features. The distribution of accident losses through the present system of property damage and liability insurance is unsatisfactory. From a systems point of view, a change to the concept of liability without fault can be endorsed.

Search terms: No-fault insurance plan*; Man machine systems; Systems analysis; Human factors engineering; Legal factors; Highway safety; Safety programs; Liability insurance*; Property damage; Accident prevention; Environmental factors; Accident factors; Traffic safety; Driver-vehicle interface

HS-005 386 Fld. 2/0; 2/4; 4/3

STANDARDS FOR HIGHWAY SAFETY IMPROVEMENTS

by Roy E. Jorgensen

Published in *American Road Builder*

v44 n6 p11-3 (Jun 1967)

Criteria for highway improvements are discussed. Hazardous locations need to be identified, forecasts made of the results of remedial action, cost-effectiveness analysis of improvements made, and the benefits and costs of spot improvements and overall highway modernization contrasted. Means for making these evaluations are discussed, especially a good accident records system.

Search terms: Accident location; Accident records; Benefit cost analysis*; Costs*; Highway maintenance; Forecasting; Spot improvement program*

HS-005 426 Fld. 2/0

CURRENT FEDERAL HIGHWAY GOALS

by Francis C. Turner

Bureau of Public Roads, Washington, D.C.

Published in *American Road Builder* p9-11 (Oct 1967)

Highways should be planned, located, designed, constructed, and maintained with an enlightened view toward their total impact on society. The safety aspects of highway planning are outlined.

Search terms: Highway planning; Highway safety; Safety standards; Federal aid; Sociological aspects

HS-810 084 Fld. 2/0; 4/1

CREATING TOMORROW'S HIGHWAY SAFETY HERITAGE

by Lawrence A. Pavlinski

National Highway Safety Bureau, Washington, D.C. Highway Safety Programs Service

Published in *Public Administration Review* p553-5 (Nov-Dec 1968)

Presented at the Traffic Court Conference, March 6-7, 1968, Eau Claire and New London, Wisconsin

Outlines the highway safety problem and its history. Explains the objectives of highway safety programs and

how they are to be financed and administered. Comments on importance of driver education programs and lists the 13 areas in which performance standards have been issued under the Highway Safety Act of 1966.

Search terms: Highway safety; Safety programs; Driver education; Performance standards; Administrative procedures; Costs*; Highway Safety Act of 1966*

HS-820 030 Fld. 1/0; 2/0; 3/0; 5/0

HIGHWAY SAFETY LITERATURE. COMPILATION OF ISSUES NUMBERED 1 THRU 52 ISSUED DECEMBER 1967 THRU DECEMBER 1968

National Highway Safety Bureau, Washington, D.C.

Jul 1969 411p

Contains HS-000 001-HS-004 302; HS-800 001-HS-800 052. For index to this volume by current subject categories see HS-820 052.

This publication brings together all citations appearing in *Highway Safety Literature's* first 52 issues from December 1967 through December 1968. The annotated citations appear under five broad categories with 53 subdivisions, reflecting the Bureau's safety standards and research interests.

Search terms: Highway safety; Motor vehicle safety; Human behavior; Motor vehicle accidents; Bibliographies

AVAILABILITY: CFSTI

HS-005 968 Fld. 3/4; 2/0

THE NATIONAL HIGHWAY SAFETY PROGRAM-18 MONTHS LATER

by William Haddon, Jr.

National Highway Safety Bureau, Washington, D.C.

Outlines the highway safety problem. Discusses the high accident rate and public indifference to it, the lack of simple solutions, and the need for better highway and vehicle design.

Search terms: Highway safety;

2/0 Highway Safety (Cont.)

HS-005-968 (Cont.)

Public opinion; Accident rates; Highway design; Motor vehicle design

AVAILABILITY: *In* Insurance Inst. for Highway Safety, *Driver Behavior: Cause and Effect*, 19-21 Mar 1968, p13-8 (HS-005967)

HS-005 969 Fld. 3/4; 2/0

NATIONAL GOALS AND PRIORITIES IN HIGHWAY SAFETY

by Sterling T. Tooker

Travelers Insurance Companies, Hartford, Conn.

Presents five priorities: interim action to contain the rise in incidence and costs of auto accidents; evolution of long-term goals; alternative plans by which long-term goals can be accomplished; development of funds necessary to implement changes; and the implementation of the program with the support of the community and the public.

Search terms: Accident rates; Costs*; Highway safety; Safety programs; Community support; Public opinion

AVAILABILITY: *In* Insurance Inst. for Highway Safety, *Driver Behavior: Cause and Effect*, 19-21 Mar 1968, p19-25 (HS-005967)

HS-005 972 Fld. 3/4; 2/0

RESEARCH AND HIGHWAY SAFETY

by Frederick Seitz

National Academy of Sciences—National Research Council, Washington, D.C.

Outlines the interest of the National Academy of Sciences in the highway safety problem.

Search terms: Highway safety; Safety research; National Academy of Sciences*

AVAILABILITY: *In* Insurance Inst. for Highway Safety, *Driver Behavior: Cause and Effect*, 19-21 Mar 1968, p51-3 (HS-005967)

HS-810 083 Fld. 1/3; 2/0; 3/0; 5/0

MYTHS AND MISCONCEPTIONS IN TRAFFIC SAFETY

by William E. Tarrants

National Highway Safety Bureau, Washington, D.C.

Published in *Robot* n43 p2-7 (Apr-May 1969)

Author recommends meeting immediate need of traffic safety with action programs based on intuition until research can provide scientific evidence for specific programs. The concepts of "accident prevention," deviant drinkers and accidents, driver behavior, pedestrian control, safety posters, and driver education are discussed, with emphasis regarding misconceptions. The contribution to accidents by vehicle design and highway design is mentioned. The importance of reliable investigation and reporting of all the causes of accidents is pointed out.

Search terms: Social drinking*; Safety programs; Accident prevention; Alcoholism; Drinking drivers; Pedestrian intoxication; Safety propaganda; Pedestrian safety; Driver education; Highway safety; Motor vehicle safety; Accident causes; Accident reports; Accident investigation; Blood alcohol levels*; Traffic safety; Automobile design; Highway design

HS-820 036 Fld. 2/0

HIGHWAY SAFETY PROGRAM MANUAL. VOLUME O. PLANNING AND ADMINISTRATION

National Highway Safety Bureau, Washington, D.C.

Jan 1969 41p

One of 17 volumes, two of which (vols. 12 and 13) are as yet unissued (see HS-820 036 to HS-820 050).

The complete manual supplements the Highway Safety Program Standards and presents additional information to assist State and local agencies to implement their highway safety programs. This volume includes general planning and administrative information about setting policy; developing, operating, evaluating, and reporting on safety programs; as well

as other details.

Search terms: Highway safety; Safety programs; State government; Local government*; Highway Safety Act of 1966*; Highway Safety Program Standards*; Federal-state relationships*; Management

AVAILABILITY: Federal Highway Administration, Washington, D.C. 20591, Attn: Records Management Branch. \$1.95

HS-006 046 Fld. 2/0; 3/9; 3/6

PRE-CRASH FACTORS IN TRAFFIC SAFETY: 12th ANNUAL SYMPOSIUM

by George G. Snively, ed.

American Assoc. for Automotive Medicine, Salem, N.J.

17-18 Oct 1968 311p

Highway safety should be of concern to medical schools. Seventeen papers explore many aspects of the highway safety problem from the standpoint of public health and preventive medicine.

Search terms: Highway safety; Medical sciences; Pre-crash phase; Driver behavior; Driver education; Conferences*; Human factors engineering; Safety standards; Driver licensing; Crashworthiness*; Emergency medical services; Traffic safety; Public health*; Accident factors

AVAILABILITY: Corporate author (Includes HS-006 047 to HS-006 063)

HS-006 047 Fld. 2/0; 3/0

MEDICAL ASPECTS OF DRIVER LICENSURE: PUBLIC HEALTH SERVICE RECOMMENDATIONS

by Richard Marland; Eugene L. Lehr
Environmental Control Administration, Cincinnati, Ohio. Injury Control Program

The Public Health Service developed criteria dealing with driver impairment for medical advisory boards. Functional classifications include: Alterations of consciousness, cardiovascular function, hearing, mental condition, musculoskeletal perfor-

2/0 Highway Safety (Cont.)

HS-006-047 (Cont.)

mance, respiratory function, and vision.

Search terms: Medical Advisory Boards*; Driver licensing; Driver physical fitness; Medical factors; Musculoskeletal system; Respiratory system; Public Health Service*; Driver license standards; Handicapped drivers; Heart diseases*; Hearing*; Mental illness; Vision disorders*

AVAILABILITY: *In* American Assoc. for Automotive Medicine, PRE-CRASH FACTORS IN TRAFFIC SAFETY, 17-18 Oct 1968, p3-8 (HS-006 046)

HS-006 048 Fld. 2/0; 3/0; 5/4

HUMAN FACTORS IN DRIVER RESEARCH

by Dennis J. Sullivan; David Meister
Bunker-Ramo Corp., Canoga Park, Calif.

5 refs

A brief description of the nature of human factors, its areas of concern, the nature of its techniques and how it relates to the medical, biomechanical, and physiological aspects of automotive safety is provided.

Search terms: Human factors engineering; Safety design; Automobile design; Driver performance; Driver behavior; Man machine systems; Motor vehicle handling; Biomechanics; Decision making*; Instrument panels

AVAILABILITY: *In* American Assoc. for Automotive Medicine, PRE-CRASH FACTORS IN TRAFFIC SAFETY, 17-18 Oct 1968, p9-37 (HS-006 046)

HS-006 049 Fld. 2/0; 3/4; 3/12

DRIVER PASSING BEHAVIOR ON TWO-LANE HIGHWAYS

by Robert S. Hostetter

HRB-Singer, Inc., State College, Pa.

The singular and combined effects of distance, speed, passing sight distance, and traffic volume on driver acceptance of passing opportunities as they

occur on rural two-lane highways were determined. Results indicate that passing sight distance is the predominant variable influencing the passing decision.

Search terms: Two lane highways; Visibility; Driver behavior; Speed; Traffic volume; Passing (driving); Regression analysis*; Variance analysis*; Decision making*; Rural highways; Gap acceptance*

AVAILABILITY: *In* American Assoc. for Automotive Medicine, PRE-CRASH FACTORS IN TRAFFIC SAFETY, 17-18 Oct 1968, p39-60 (HS-006 046)

HS-006 050 Fld. 2/0; 5/14

EUROPEAN RESEARCH, STANDARDIZATION AND REGULATIONS ON PROTECTIVE DEVICES

by J. P. DeCoster

Fonds d'Etudes et de Recherches pour la Securite Routiere, Brussels (Belgium)

International bodies concerned with protective devices are described and their testing techniques outlined. Standards for restraint systems and other safety equipment in Europe are described. Objectives of various European safety organizations are discussed.

Search terms: Highway safety; Europe*; Safety standards; Restraint systems; Occupant protection*; Motor vehicle safety; Motor vehicle equipment; Test facilities*; Safety programs

AVAILABILITY: *In* American Assoc. for Automotive Medicine, PRE-CRASH FACTORS IN TRAFFIC SAFETY, 17-18 Oct 1968, p61-96 (HS-006 046)

HS-006 051 Fld. 2/0; 5/14

CRASH PERFORMANCES OF THE NEW AUTOMOBILE SAFETY FEATURES

by Donald F. Huelke; William A. Chewning

Michigan Univ., Ann Arbor

30 refs

Field investigations of automobile crashes involving new model cars, with new safety features, indicate a marked increase in occupant safety. Areas of improvement by automobile manufacturers include: windshields, ejection, steering assemblies, instrument panels, passenger compartment integrity, lap and shoulder belts.

Search terms: Chest injuries; Facial injuries; Injury prevention; Steering columns; Energy absorption; Instrument panels; Seat belts; Shoulder harnesses; Safety design; Automobile design; Occupant protection*; Impact tests; Crashworthiness*; Windshields; Ejection; Knee injuries

AVAILABILITY: *In* American Assoc. for Automotive Medicine, PRE-CRASH FACTORS IN TRAFFIC SAFETY, 17-18 Oct 1968, p97-115 (HS-006 046)

HS-006 052 Fld. 2/0; 1/1; 1/3

AN ANALYSIS OF EMERGENCY MEDICAL SERVICE FATAL AND NON-FATAL MOTOR VEHICLE INJURIES IN SAN FRANCISCO

by Barry Griffith King; Gertrud Weiss; Ellis Sox

Environmental Control Administration, Cincinnati, Ohio. Injury Control Program

9 refs

The nature and severity of injury and the physical characteristics of the victim are principal factors in establishing the demands on an emergency care system. Analysis was made of 1,162 dead-on-arrival victims and a 20% sample of some 50,000 other cases. Survival potential of the fatality cases is analyzed and three case histories given. Detailed information on injuries and time factors is necessary to evaluate emergency medical care systems.

Search terms: Accident data; Emergency medical services; Ambulances; Autopsies*; Fatalities; Hospitals*; Time factors*; Case reports*; Injury factors; Injury severity; San Francisco*; Motor vehicle accidents

AVAILABILITY: *In* American Assoc. for Automotive Medicine, PRE-CRASH FACTORS IN TRAFFIC SAFETY, 17-18 Oct 1968, p117-125 (HS-006 046)

2/0 Highway Safety (Cont.)

HS-006-052 (Cont.)

FIC SAFETY, 17-18 Oct 1968,
p117-39 (HS-006 046)

HS-006 053 Fld. 2/0; 1/3; 3/4

MAPPING YOUNG DRIVERS IN BEHAVIORAL SPACE

by Stanley H. Schuman; Donald C.
Pelz

Michigan Univ., Ann Arbor. Highway
Safety Research Inst.

3 refs

Michigan data is presented on types
of fatal accidents characteristic of
young drivers. Drivers are grouped
into six categories and their driving
behavior and risk taking analyzed.
Single car accidents are found to be
characteristic of young male drivers.

Search terms: Age factor in acci-
dents; Sex factor in accidents;
Driver attitudes; Personality;
Problem drivers; Driver behavior;
Sociological aspects; Behavior
analysis; Michigan*; Young adult
drivers*; Risk taking*; Single
vehicle accidents; Fatalities; Psycho-
logical factors

AVAILABILITY: *In* American
Assoc. for Automotive Medicine,
PRE-CRASH FACTORS IN TRAF-
FIC SAFETY, 17-18 Oct 1968,
p141-54 (HS-006 046)

HS-006 054 Fld. 2/0; 2/9

OPTICAL PROPERTIES OF RE- FLEX REFLECTORS AND THE USE OF COLOR IN TRAFFIC GUIDANCE

by John O. Elstad

Minnesota Mining and Manufacturing
Co., St. Paul

5 refs

Enclosed lens reflectors function well
in rainy conditions, while exposed
lens reflectors become dimmer in the
rain. Experiments with blue for
signing and delineation of exits from
freeways showed a 50% reduction in
erratic movements for both day and
night conditions. Tests were made in
Michigan and Minnesota. The use of
color in traffic guidance is a method
that may effectively provide visual
cues to motorists.

Search terms: Color; Reflectors;
Night driving; Lenses; Traffic
markings; Michigan*; Minnesota*;
Signal color; Freeways; Exits;
Visibility; Traffic control devices;
Rain; Wet road conditions; Bright-
ness

AVAILABILITY: *In* American
Assoc. for Automotive Medicine,
PRE-CRASH FACTORS IN TRAF-
FIC SAFETY, 17-18 Oct 1968,
p155-63 (HS-006 046)

HS-006 055 Fld 2/0; 3/4

RESPONSE BLOCKING: A NECESSARY PERFORMANCE CRITERION

by Warren H. Teichner

Harvard Univ., Boston Mass.
Guggenheim Center for Aerospace
Health and Safety

9 refs

The concept of response blocking is
explained. It is an attentional process
in high speed, continuous, decision-
making tasks. Any interruption of the
driving task by failure to respond
increases the probability of accident.
These lapses of attention are closely
related to driver fatigue, sleep loss,
reaction time, and emotional con-
dition. Response blocking is an
inherent characteristic of human per-
formance. Reaction times may be
used to predict the probability of
accident.

Search terms: Emotions*; Psycho-
logical factors; Reaction time;
Driver performance; Driving tasks;
Forecasting*; Accident risks; Driver
fatigue; Decision making*; Sleep*;
Human behavior; Driver behavior;
Attention lapses*

AVAILABILITY: *In* American
Assoc. for Automotive Medicine,
PRE-CRASH FACTORS IN TRAF-
FIC SAFETY, 17-18 Oct 1968,
p165-80 (HS-006 046)

HS-006 056 Fld. 2/0; 3/8

LEAD INTOXICATION IN AUTO- MOTIVE SPORTS

by M. A. Polacek; Daniel P. Collins

13 refs

An epidemiological survey revealed
improper exposure to engine cleaning

solvents containing high lead con-
centrations became a new source of
lead intoxication. Race car drivers
and mechanics showed laboratory and
clinical evidence of significant lead
exposure.

Search terms: Blood lead levels*;
Automobile engines; Lead (metal)*;
Laboratory tests; Cleaning agents*;
Racing automobiles; Lead
poisoning*; Health hazards; Blood
analysis*

AVAILABILITY: *In* American
Assoc. for Automotive Medicine,
PRE-CRASH FACTORS IN TRAF-
FIC SAFETY, 17-18 Oct 1968
p181-91 (HS-006 046)

HS-006 057 Fld. 2/0; 3/1

THE EFFECTS OF ALCOHOL ON DRIVING SKILLS

by David R. McLellan

General Motors Proving Ground,
Milford, Mich.

More than half the nation's 50,000
annual traffic deaths are caused by
drinking drivers. This General Motors
Proving Grounds study used two
driving tests with film records to
evaluate some of the effects of
alcohol on driving skills. Few of the
drivers had trouble when blood
alcohol was .05%. Test results will be
described in a film and related to
Michigan's Implied Consent Law
which accepts a legal limit of .10%
blood alcohol.

Search terms: Drinking drivers;
Blood alcohol levels*; Driving tasks;
Cinematography*; Implied consent
laws*; Michigan*; Reaction time;
Performance tests; Driver intoxica-
tion; Driver performance

AVAILABILITY: *In* American
Assoc. for Automotive Medicine,
PRE-CRASH FACTORS IN TRAF-
FIC SAFETY, 17-18 Oct 1968,
p193-202 (HS-006 046)

HS-006 058 Fld. 2/0; 3/6; 3/9

PREVENTIVE MEDICINE: CALI- FORNIA'S DRIVER IMPROVE- MENT PROGRAM

by Keith Ball

California. Dept. of Motor Vehicles
Sacramento

6 refs

2/0 Highway Safety (Cont.)

HS-006-058 (Cont.)

Driver licensing practices of California are discussed in relation to drivers with physical or mental disabilities. The importance of the medical profession in evaluating such drivers is emphasized. A number of case histories are given to illustrate the types of driver impairment which are grounds for drive license denial or suspension—epilepsy, losses of consciousness, diabetes, heart disease, narcolepsy, and similar conditions.

Search terms: Case reports*; Driver licensing; Handicapped drivers; Driver physical fitness; Mental illness; California*; Epilepsy*; Diabetes mellitus*; Heart diseases*; Narcolepsy*; Driver license denial; Driver license suspension; Physicians*

AVAILABILITY: *In* American Assoc. for Automotive Medicine, PRE-CRASH FACTORS IN TRAFFIC SAFETY, 17-18 Oct 1968, p203-22 (HS-006 046)

HS-006 059 Fld. 2/0; 1/3

MEDICAL-ENGINEERING PANEL: THE STORY OF AN ACCIDENT

by Harold A. Fenner, Jr.; W. Jack Ruby; Donald F. Huelke; Arnold W. Siegel

Ford Motor
21 refs

Some engineering concepts and problems in accident investigation are introduced to the medical profession. Reconstruction of the injury producing mechanisms in an automobile collision is a major problem. Standards for the description of injuries are urgently needed.

Search terms: Injury factors; Accident investigation; Human factors engineering; Kinematics; Motor vehicle dynamics; Injury severity; Collisions (accidents); Restraint systems; Rear end collisions; Side impact collisions; Interior design; Automobile design; Speed; Rollover accidents

AVAILABILITY: *In* American Assoc. for Automotive Medicine, PRE-CRASH FACTORS IN TRAF-

FIC SAFETY, 17-18 Oct 1968, p223-44 (HS-006 046)

HS-006 060 Fld. 2/0; 3/5

THE EFFECT OF QUALITATIVELY DIFFERENT DRIVER EDUCATION PROGRAMS ON FREQUENCY OF ACCIDENTS AND VIOLATIONS

by Frederick L. McGuire

California Univ., Irvine. Dept. of Psychiatry and Human Behavior

Evidence which indicates that driver education programs tend to result in reduced accident rates are the result of faulty design. This study compares two driver training programs and concludes that the addition of simulator and behind the wheel training does not result in a different accident rate. Recommends support of quality research which may uncover effective training methods to modify driver behavior.

Search terms: Driver education; Driver behavior; Automobile simulators; Accident rates; Behind-the-wheel instruction*; High school driving courses*; High school drivers; Driver education evaluation*

AVAILABILITY: *In* American Assoc. for Automotive Medicine, PRE-CRASH FACTORS IN TRAFFIC SAFETY, 17-18 Oct 1968, p245-58 (HS-006 046)

HS-006 061 Fld. 2/0; 3/5

LOGICAL FALLACIES IN RESEARCH ON DRIVER EDUCATION

by Gerald J. Driessen

National Safety Council, Chicago, Ill.
10 refs

A distinction in driver education is made between formal training and informal training. Drivers taught by friends may learn as much or more about accident avoidance as drivers taught in a high school course. To use accident reduction as a criterion of the effectiveness of driver education courses, the amount and quality of accident avoidance training in formal and informal teaching should be measured and compared.

Search terms: Driver education;

Accident prevention; Behind-the-wheel instruction*; Driver education evaluation*; Defensive driving*; High school driving courses*; Accident rates; Classroom driver instruction*

AVAILABILITY: *In* American Assoc. for Automotive Medicine, PRE-CRASH FACTORS IN TRAFFIC SAFETY, 17-18 Oct 1968, p260-73 (HS-006 046)

HS-006 062 Fld. 2/0; 4/2

THE AAAM-ITS EDUCATIONAL POTENTIAL IN THE MEDICAL COMMUNITY

by Donald F. Huelke

Michigan Univ., Ann Arbor

The role of the American Association for Automotive Medicine in the traffic safety problem is discussed. Goals, membership expansion, promotional campaigns, journal publication, are outlined

Search terms: American Association for Automotive Medicine*; Traffic safety; Physicians*; Community support; Safety campaigns

AVAILABILITY: *In* American Assoc. for Automotive Medicine, PRE-CRASH FACTORS IN TRAFFIC SAFETY, 17-18 Oct 1968, p275-9 (HS-006 046)

HS-006 063 Fld. 2/0

SOCIETY'S RESPONSIBILITY IN TRAFFIC SAFETY: A PANEL DISCUSSION

by Lloyd M. Rockne; Douglas A. Fraser; Russel E. MacCleery; Harry M. Philo, Nils A. Lofgren

Problems discussed are: drinking drivers, alcoholism, safety standards, safety design and devices of cars, quality control in the automobile industry legal liability for auto accidents, and the need for a larger effort to solve the highway safety problem.

Search terms: Traffic safety; Safety design; Drinking drivers; Automotive industry; Insurance claims; Liability*; Highway safety; Drinking drivers; Alcoholism; Safety standards; Quality control Automobile design; Safety devices; Automobile accidents

2/0 Highway Safety (Cont.)

HS-006-063 (Cont.)

AVAILABILITY: In American Assoc. for Automotive Medicine, PRE-CRASH FACTORS IN TRAFFIC SAFETY, 1968, p281-305 (HS-006 046)

HS-820 053 Fld. 2/0; 5/0

EXECUTIVE SUMMARIES. NATIONAL HIGHWAY SAFETY BUREAU CONTRACTORS REPORT: JANUARY 1968 THRU FEBRUARY 1969

National Highway Safety Bureau, Washington, D.C.

1969 211p

Includes corrected pages v-xi

National Highway Safety Bureau contract reports which have been made available to the public are summarized. Subjects covered are: improvement of safety performance standards for motor vehicles and equipment; safety of vehicles in use; state and community highway safety programs; accident investigation and information; highway safety research and test facilities; administration of the National Highway Safety Bureau.

Search terms: Drivers; Pedestrians; Safety standards; Accident investigation; Motor vehicle safety; Highway safety; Safety programs; National Highway Safety Bureau*;

HS-006 103 Fld. 2/0

ITE STATEMENT: EFFECTIVENESS OF THE HIGHWAY SAFETY ACT

by Carlton C. Robinson

Published in *Traffic Engineering* v39 n11 p54, 56-7, 60 (Aug 1969)

Presented before the Subcommittee on Roads, U.S. Senate Committee on Public Works, June 26, 1969.

This testimony from the Institute of Traffic Engineers suggests that the Highway Safety Act of 1966 has been effective within the limits of its financing and that its administration has been soundly patterned. It further confirms the optimal placement of the National Highway Safety Bureau within the Federal Highway

Administration. Areas which require more effective implementation in the future are discussed in five categories: 1. Local government involvement; 2. Manpower development; 3. Research; 4. Effective driver communication; 5. Money. The institute recommends that the bureau promulgate minimum standards for traffic engineering services just as there are for police traffic services.

Search terms: Traffic engineering; National Highway Safety Bureau*; Safety standards; Highway safety; Highway Safety Act of 1966*; Safety research; Traffic control devices; Manpower utilization*; Federal aid; Local government*; Highway communication; Appropriations*

HS-006 104 Fld. 2/0; 4/1

REPORT OF THE LEGISLATIVE RESEARCH COUNCIL RELATIVE TO MASSACHUSETTS IMPLEMENTATION OF THE NATIONAL HIGHWAY SAFETY ACT OF 1966

by Robert D. Webb

Massachusetts. Legislature, Boston

30 Jan 1968 77p

Report no. Senate-980

The provisions of the Highway Safety Act of 1966 are outlined and the extent to which Massachusetts has complied are detailed. The problems of financing compliance are discussed. Included are efforts to meet standards in driver education, licensing, motorcycle safety, traffic records, motor vehicle inspection and registration, highway design, traffic control devices, accident location identification, codes and laws, traffic courts, emergency medical services, implied consent laws and blood alcohol tests, and drugs.

Search terms: Highway Safety Act of 1966*; Compliance procedures; Driver education; Driver licensing; Motorcycle safety; Traffic records; Motor vehicle inspection; Motor vehicle registration; Highway design; Traffic control devices; Accident location; Traffic laws; Traffic courts; Emergency medical services; Implied consent laws*; Blood alcohol levels*; Drugs; Massachusetts*

HS-006 268 Fld. 1/1; 2/0

THE REVOLUTION IN TRAFFIC SAFETY

by Edwin L. Kirby

National Safety Council, Chicago, Ill. 17p

Traces the history of traffic safety and outlines the major provisions of the Highway Safety Act of 1966. Background data concerning a model ordinance regulating ambulance service is presented. Three main problem areas are considered: traffic regulation of casualty carrying vehicles; training and competency of ambulance personnel; equipment of emergency vehicles.

Search terms: Ambulances; Emergency medical services; Legislation; Highway Safety Act of 1966; Personnel; Traffic safety; Emergency equipment

AVAILABILITY: In Nebraska Univ. Dept. of Surgery, PROCEEDINGS OF 1966 NEBRASKA CONFERENCE ON AMBULANCE AND RESCUE SQUAD SERVICES, 1 Mar 1967 (HS-006 265)

HS-006 297 Fld. 3/5; 2/0

THE HIGHWAY SAFETY ACT'S POTENTIAL IMPACT ON DRIVER EDUCATION

by Thomas A. Seals

Published in *California Journal of Traffic Safety Education* v16 n4 p9-11, 24 (June 1969)

The role of the National Highway Safety Bureau is outlined, especially the safety standards. Provisions of the driver education standard are discussed. The bureau's guidelines can serve as a catalyst in improving the quality of high school and commercial driving school courses.

Search terms: Driver education; National Highway Safety Bureau; Highway Safety Act of 1966; Safety programs; Safety standards; Commercial driving schools; Driver education evaluation; High school driving courses

HS-006 387 Fld. 2/0

JOURNAL INTERVIEW: DR. WILLIAM HADDON, JR.

2/0 Highway Safety (Cont.)

HS-006-387 (Cont.)

by William Haddon, Jr.

Published in *Journal of American Insurance* v45 n4 p8-12 (Sep-Oct 1969)

The current state of the highway safety movement is discussed. The role of the Insurance Institute for Highway Safety is outlined. The federal government, the insurance industry, and the public all have a role in supporting highway safety. Specific accomplishments and problems of the safety movement to date are discussed.

Search terms: Community support; Public opinion; Insurance industry; Highway safety; Insurance Institute for Highway Safety; United States Government; Safety programs

HS-820 054 Fld. 2/0; 5/0

HIGHWAY SAFETY PROGRAM PRIORITIES SEMINAR, FREDERICKSBURG, VIRGINIA, JULY 18-20, 1969. PROCEEDINGS, VOL. 1: BACKGROUND AND SUMMARY; EXPECTATIONS AND LIMITATIONS; FINAL SESSION

National Highway Safety Bureau, Washington, D.C.

1969 50p

Report no. PB-186 268

A seminar was held to determine what aspects of highway and motor vehicle safety programs should receive special emphasis within available resources. Task forces prepared discussion papers on ten aspects of the safety problem, published in ten volumes. This volume gives the background of the seminar and a paper on expectations and limitations in reducing highway crash losses.

Search terms: Conferences; Highway safety; Safety programs; Benefit cost analysis; Motor vehicle safety

AVAILABILITY: CFSTI as PB-186 268 (Includes analytic HS-820 066)

HS-820 064 Fld. 4/2; 2/0

HIGHWAY SAFETY PROGRAM PRIORITIES SEMINAR, FREDERICKSBURG, VIRGINIA.

JULY 18-20, 1969. PROCEEDINGS, VOL. 10: PUBLIC INFORMATION AND HIGHWAY SAFETY

National Highway Safety Bureau, Washington, D.C.

1969 34p

Report no. PB-186 277

The degree of success of any public information program depends upon the extent to which the objectives of the overall enterprise are explicit, realistic, consistent with one another, and based upon knowledge. The failure to arrive at such objectives in the highway safety field has been the root of frustration in the public information area and other program areas. It is difficult to achieve consistency in building public support for costly highway improvements while trying to solve the same problems by changing the behavior of drivers and pedestrians. Recommendations for a more successful information program are made.

Search terms: Community support; Public opinion; Public relations; Safety propaganda; Safety campaigns; Highway safety; Driver behavior; Pedestrian behavior; Highway costs; National Highway Safety Bureau

AVAILABILITY: CFSTI as PB-186 277

HS-006 440 Fld. 2/0

STUDY OF COMPATIBILITY OF STANDARDS FOR DRIVERS, VEHICLES, AND HIGHWAYS

National Transportation Safety Board, Washington, D.C.

11 Jun 1969 38p

Includes transmittal letter of June 25, 1969, to Francis C. Turner, FHWA, from John H. Reed, NTSB.

This study considers the problems of everyday traffic situations in which the interrelationships of all elements of the traffic safety system—drivers, vehicles, and the highway environment—are not adequately described by existing standards. Three recommendations to the Federal Highway Administration reflect: the need for having all new standards compatible in all aspects; the need for leadership among standardizing organizations; the need for development of technical

definitions of an interim transitional nature. Examples discussed are windshield visibility and traffic signs; driver vision, rearview mirror visibility and highway design; vehicle design and highway design.

Search terms: Traffic safety programs; Safety standards; Motor vehicle design standards; Windshields; Visibility; Highway signs; Traffic signals; Highway design; Rearview mirrors; Driver-vehicle interface; Highway standards; Driving tasks; Visibility; Automobile design; Rear visibility

AVAILABILITY: Corporate author

HS-800 174 Fld. 2/0

THE FEASIBILITY OF ESTABLISHING HIGHWAY SAFETY MANPOWER DEVELOPMENT AND RESEARCH CENTERS AT UNIVERSITY - LEVEL INSTITUTIONS. VOLUME 1. STUDY REPORT (FINAL REPORT)

by Maury H. Chorness; Richard P. Howell; John J. McAuliffe; Kendall D. Moll; Milan Radovic; Henry E. Pedraza

Stanford Research Inst., Menlo Park, Calif.

Jul 1969 343 p

Contract FH-11-6917; PB-186 555

The objective of this study was to examine the feasibility of establishing centers at universities to train three types of manpower: safety specialists, safety professionals, and research manpower. The study examines skills and disciplines required for highway safety education; program strategies for such research centers; criteria for the selection of universities; results of discussions with officials of 16 universities; administrative guidelines and evaluation plans for the centers; congressional justification for their establishment; and proposals for the establishment of regional pilot centers.

Search terms: Manpower utilization; Highway safety; Universities; Research centers; Education; Safety programs; Administrative procedures; Federal aid

AVAILABILITY: CFSTI as PB-186 555

2/0 Highway Safety (Cont.)

HS-800 175 Fld. 2/0

THE FEASIBILITY OF ESTABLISHING HIGHWAY SAFETY MANPOWER DEVELOPMENT AND RESEARCH CENTERS AT UNIVERSITY-LEVEL INSTITUTIONS. VOLUME 2. APPENDIXES (FINAL REPORT)

by Maury H. Chorness; Richard P. Howell; John J. McAuliffe; Kendall D. Moll; Milan Radovic; Henry E. Pedraza

Stanford Research Inst., Menlo Park, Calif.

Jul 1969 53p 27 refs
Contract FH-11-6917; PB-186 556

This volume contains statistical projections of manpower needs in the highway safety field. It analyzes the skills and disciplines needed in the field, the development of program strategy for the placement of research centers, the criteria for the selection of universities, identification of candidate universities, and material on visits to candidate universities.

Search terms: Forecasting; Statistical analysis; Manpower utilization; Highway safety; Research centers; Universities; Education; Curricula; Instructors

AVAILABILITY: CFSTI as PB-186 556

HS-810 088 Fld. 2/0; 5/0

DOT INVITES SAE TO HELP SET GOALS FOR HIGHWAY SAFETY PROGRAM

by Thomas F. Malone; J. Sam Winters; Philip S. Myers

National Highway Safety Bureau, Washington, D.C. Society of Automotive Engineers, Inc., New York

Published in *SAE Journal* v77 n8 p27-30 (Aug 1969)

In an exchange of letters, the U.S. Department of Transportation has requested the Society of Automotive Engineers' suggestions concerning the agency's goals to reduce the highway fatality rate one half by 1980, and the requirements needed to achieve the goal with respect to the driver, traffic environment, and vehicle.

SAE's reply pinpoints the driver as the greatest source of failure and urges emphasis in this area especially with regard to alcohol and drug caused deaths, physically unfit drivers, driver licensing standards, law enforcement, driver training; upgrading of highway design; safer vehicle design and mandatory inspection; and research on cost-effectiveness in accident reduction.

Search terms: Department of Transportation; Society of Automotive Engineers; Highway safety; Safety programs; Accident prevention; Motor vehicle inspection; Fatalities; Driver characteristics; Environmental factors; Highway design; Accident factors; Benefit cost analysis; Safety design; Drinking drivers; Driver license standards; Driver physical fitness; Driver education; Automobile design; Drug addiction; Traffic law enforcement

HS-800 184 Fld. 2/0

OVERVIEW OF INTERNATIONAL HIGHWAY SAFETY PROBLEMS

Leasco Systems and Research Corp., Bethesda, Md. Management Systems Group

30 Jun 1969 319p
Contract FH-11-6920
Report no. MSG-104/69

The application of U.S. safety standards to imported vehicles has led to pressure on the United States to participate in the international movement for uniform standards. The purposes of this study were to define the highway safety problem in the key industrial countries which export cars to the U.S.; identify the principal government, public, and private organizations and their highway safety activities; and explore the international mechanisms for harmonizing motor vehicle regulations and for coordinating research and information exchange activities. Countries studied were Canada, England, Germany, France, Italy, and Japan. The increase in motor vehicle registration, the accident rates, government regulation and control activities are examined. Four of the five countries studied have higher accident rates, especially for pedestrians, than the U.S., and little control of speed.

Search terms: United States; Cana-

da; Great Britain; Germany; France; Italy, Japan; International aspects; Highway safety; Safety standards; Information systems; Foreign vehicles; Accident rates; Federal control; Highway research; Motor vehicle registration; Safety research; Fatalities; Pedestrian accidents; Speed

AVAILABILITY: CFSTI

HS-810 089 Fld. 2/0; 5/0

REMARKS AT THE CONFERENCE ON ROLE OF COMMUNITY COLLEGES IN EDUCATION TRAFFIC AND TRANSPORTATION PERSONNEL, RIO HONDO JUNIOR COLLEGE, WHITTIER, CALIFORNIA

by Bradford M. Crittenden

National Highway Safety Bureau, Washington, D.C. Highway Safety Programs Service

14 Jun 1968 12p

The highway safety problem is outlined. The factors of concern are in three groups: pre-crash, crash, and post-crash. Safety progress since passage of the two safety acts is briefly outlined. Manpower needs to implement State highway safety programs are discussed. The college community is challenged to develop adequate courses of study and to include as many new courses as are necessary to overcome problems related to driver education.

Search terms: Community support; Driver education; Highway safety; Universities; Manpower utilization; Crash phase; Pre-crash phase; Post-crash phase; Safety standards; Safety laws

AVAILABILITY: NHSB

HS-006 665 Fld. 2/0

SAFE AND EFFICIENT HIGHWAY TRANSPORTATION. THE ROLE OF THE AUTOMOTIVE SAFETY FOUNDATION

by Charles H. Hartman

Published in *Caldea Calendar* v13 n3 p21-3 (Mar 1966)

The Automotive Safety Foundation, a non-profit educational and research

2/0 Highway Safety (Cont.)

HS-006-665 (Cont.)

institution, supports highway safety through grants and staff services. Its activities are outlined, particularly those dealing with driver education and the training of technical personnel.

Search terms: Highway safety; Driver education; Manpower utilization; Automotive Safety Foundation; Highway transportation

HS-006 666 Fld. 2/0; 4/7

METHODOLOGY FOR DETERMINING TRAFFIC SAFETY PRIORITIES: A COLLISION PREDICTION MODEL

by B. F. Goeller

Rand Corp., Santa Monica, Calif.
Feb 1969 36p 22 refs
Report no. P-3962

Presented at the nation's First Regional Highway Safety Conference, 16-17 Oct 1968, at Mississippi State Univ., and in modified form to a special seminar at Insurance Inst. for Highway Safety, Washington, D.C., 16 Jan 1969.

Decision makers need to be able to determine priorities so as to get the most safety from available resources. The preliminary safety model is broken into three natural stages: pre-accident stage, intra-accident stage, and post-accident stage. Safety activities for each stage are analyzed. Dangers, hazards, and risks are described. The vulnerability concept is basic to the pre-accident stage of the model. It deals with driver decision making and errors. The intra-accident stage of the model predicts the number of collisions expected from the vulnerabilities which have been determined, and means by which collisions may be evaded.

Search terms: Defensive driving; Systems analysis; Highway safety; Models; Traffic safety; Accident factors; Driver behavior; Driver skills; Forecasting; Accident prevention; Accident risks; Collisions (accidents); Hazards; Priorities; Pre-crash phase; Post-crash phase; Crash phase; Benefit cost analysis; Decision making

AVAILABILITY: Corporate author
HS-810 091 Fld. 2/0; 1/3

REMARKS AT THE 48th ANNUAL CONFERENCE OF THE WESTERN ASSOCIATION OF STATE HIGHWAY OFFICIALS, PHOENIX, ARIZONA

by Francis C. Turner

Federal Highway Administration,
Washington, D.C.

3 Jun 1969 13p

Progress and needs in the highway safety field are discussed, especially the accomplishments of state programs. Especially needed are a system for locating accident sites, a good traffic records system, a procedure for identifying hazards, a system for ranking proposed safety projects, and a before-and-after evaluation program.

Search terms: Highway safety; Accident prevention; Safety programs; State government; Accident location; Hazards; Benefit cost analysis; Traffic records; Accident records

AVAILABILITY: Federal Highway Administration, Washington, D.C.
Office of Public Affairs

HS-810 092 Fld. 2/0

THE ROLE OF THE UNIVERSITY IN HIGHWAY SAFETY RESEARCH. SPEAKING OUTLINE

by James M. Beggs

Department of Transportation,
Washington, D.C.

1969 14p

Presented by Robert Brenner, Acting Director, National Highway Safety Bureau, at the dedication ceremony of Univ. of Michigan Highway Safety Research Inst., Ann Arbor, 2 Oct 1969.

Highway safety's research needs range from the highly problem-oriented, applied, scheduled research to the more general basic, schedule-free effort at the other extreme. The university is one of the most important resources in the all-out attack on highway deaths and injuries. Its role should be keyed towards basic research. Institutional grants, the creation of research centers in highway safety, and the further support

of transportation education should enhance the university's role in the highway safety effort.

Search terms: Universities; Research centers; Highway safety; Transportation; Education; Federal aid

AVAILABILITY: Federal Highway Administration Washington, D.C.,
Office of Public Affairs

HS-810 093 Fld. 2/0; 5/0

REMARKS AT THE FHWA HIGHWAY SAFETY SYMPOSIUM, AIRLIE HOUSE, WARRENTON, VIRGINIA

by William Haddon, Jr.

National Highway Safety Bureau,
Washington, D.C.

31 Jul 1968 20p

Outlines progress made and standards developed as a result of the passage of the Highway Safety Act of 1966 and the National Traffic and Motor Vehicle Safety Act of 1966. Covers problems which are divided into three general phases: the pre-crash, crash, and post-crash. Cites specific problems as the lack of emergency medical services, public understanding, alcohol involvement in accidents, packaging of passengers, highway design, and social issues.

Search terms: Highway safety; Passenger packaging; Pre-crash phase; Crash phase; Post-crash phase; Emergency medical services; Highway Safety Act of 1966; National Traffic and Motor Vehicle Safety Act of 1966; Sociological aspects; Drinking drivers; Highway design; Mass communication; Driver intoxication; Restraint systems; Safety design; Secondary collisions; Injury factors

AVAILABILITY: NHSB

HS-820 055 Fld. 4/5; 2/0

HIGHWAY SAFETY LITERATURE SUBJECT CATEGORY (FIELD/GROUP) INDEX TO ISSUE NUMBERS 1 THRU 52 (DECEMBER 1967 THRU DECEMBER 1968)

National Highway Safety Bureau,
Washington, D.C.

2/0 Highway Safety (Cont.)

HS-820-055 (Cont.)

1 Sep 1969 35p

Documents announced in issues 1-52, Dec 1967-Dec 1968 of Highway Safety Literature, are indexed by current field and group categories. A conversion table from the subject category headings, under which these documents were originally announced, to the current system is included.

Search terms: Information retrieval; Highway safety; Accidents; Human factors engineering; Motor vehicle safety; Safety programs

AVAILABILITY: NHSB

HS-810 040 Fld. 2/0,5/0

THE NEW NATIONAL HIGHWAY
SAFETY PROGRAM
by Robert Brenner
National Highway Safety
Bureau, Washington, D. C.

5 Jun 1967 25p

Presented by Bradford M.
Crittenden at the Eastern
Oil Industry TBA Group,
Lancaster, Pa.

Programs carried out under the National Traffic and Motor Vehicle Safety Act and Highway Safety Act, both of 1966. Standards, research, safety. Work of National Highway Safety Bureau, including cooperation with Bureau of Standards and auto industry.

Search terms: Automotive industry, Highway research, Highway safety, Highway Safety Act of 1966, Highway standards, Motor vehicle safety, National Highway Safety Bureau, National Traffic and Motor Vehicle Safety Act of 1966, Safety programs, Safety research, Safety standards, Standards

AVAILABILITY: NHSB

2/1 Breakaway Structures

HS-004 346 Fld. 2/1

DESIGNING FREEWAY MEDIANS, RIGHT SHOULDERS AND SIDE SLOPES

by H. R. Cooke

Harris (Frederic R.) of Canada Ltd., Toronto

Published in *Civil Engineering-ASCE* v 38 n9 p61-63 (Sep 1968)

When and where guardrails, collapsible structures, and energy-absorbing devices should be used is discussed. Comments are made on several studies attempting to pinpoint the causes of encroachment across median. Light, weather, and fatigue seemed to be leading factors. Recommends use of energy-absorbing devices at guardrail terminals and for protecting heavy fixed objects.

Search terms: Guardrails; Road shoulders; Median barriers; Slope; Highway design; Energy absorption; Head on collisions; Driver fatigue; Accident factors; Light (visible radiation); Weather; Driving conditions

HS-004 578 Fld. 2/1

BREAKAWAY SIGN POSTS REDUCE TRAFFIC HAZARDS

Anonymous

Published in *American City* v84 n1 p112 (Jan 1969)

Describes program for replacing ordinary signs with breakaway bases and removing various other hazards from the roadside environment. Safety sign post is described in detail.

Search terms: Breakaway bases*, Signs (displays), Accident risks, Hazards, Injury prevention, Highway design, Poles (supports), Clean Up Roadside Environment*, Roadside equipment

HS-004 687 Fld. 2/1

FLEXIBLE HIGHWAY POSTS

Anonymous

Published in *Fleet Owner* v59 n4 p100 (Apr 1964)

Describes rubber posts, which absorb the impact of a vehicle and reduce the danger of injury and vehicular damage to the vanishing point.

Search terms: Poles (supports), Rubber*, Injury prevention, Energy absorption, Impact protection

HS-004 688 Fld. 2/1

LIGHTING COLUMNS AS COLLISION HAZARDS

by A. W. Christie
Road Research Lab., Harmondsworth, Mddlx. (England)

Published in *Roads and Road Construction* p200-201 (Jul 1966)

Extracts from "Research Into Lighting and Accident Problems" presented at the Annual Conference of the Institution of Municipal Engineers

In fatal accidents involving lighting columns, the cause of death is most often collision with the column. Research is presented which ensures low impact resistance by incorporating a shear joint close to ground level. Concrete, tubular steel and wooden columns were tested.

Search terms: Single vehicle accidents, Hazards, Fixed objects, Lighting design, Breakaway bases*, Poles (supports)

HS-004 750 Fld. 2/1

LIGHTING COLUMNS AS COLLISION HAZARDS

by A. W. Christie

Published in *Traffic Engineering and Control* v10 n7 p372-4 (Nov 1968)

Brief summary of new research dealing with breakaway lighting columns. Coroners' reports show that there are more fatal collisions with lighting columns than with other single types of fixed objects located off the highway.

Search terms: Lighting design, Poles (supports), Hazards, Collisions (accidents), Breakaway bases*, Safety design

HS-004 865 Fld. 2/1

THE CONCEPT OF COLLAPSIBLE SIGN SUPPORTS

by H. Hong

Published in *Traffic Engineering* v37 n5 p41-5 (Feb 1967)

Various concepts for collapsible sign supports have been investigated and designs for different types of connections proposed. Physical tests should be conducted on some designs. The designs worthy of further investigation seem to be shear-pin joint, welded joint, clip joint, and multi-member supports. A better sign support design modified by field tests would serve to increase highway safety.

Search terms: Breakaway bases*, Highway safety, Accident prevention, Field tests, Materials tests, Poles (supports)

HS-005 145 Fld. 2/1

BREAKAWAY LIGHTING COLUMNS

by A. E. Walker; J. H. Hignett

Published in *Highways and Public Works* v35 n1689 p28-29, 31, 33, 35

Collision tests are described on lighting columns of concrete, tubular steel, thin sheet steel, aluminum, timber, and fiberglass. Low impact resistance is best achieved by lightweight metal columns incorporating a shear joint near ground level. Danger of secondary collision with pole breaking over the car must be considered.

Search terms: Collision tests;

2/1 Breakaway Structures (Cont.)

HS-005-145 (Cont.)

Breakaway bases*; Lighting design; Great Britain*; Concretes; Steels; Aluminum*; Wood; Fiber glass*; Secondary collisions; Impact tolerance; Materials tests; Poles (supports)

HS-005 146 Fld. 2/1

BREAK-AWAY COMPONENTS PRODUCE SAFER ROADSIDE SIGNS

by Robert M. Olsen; Neilon J. Rowan; Thomas C. Edwards

Texas A and M Univ., College Station. Texas Transportation Inst.

Published in *Highway Research Record* n174 p1-29 (1967) 17 refs

Presented at the 46th Annual Meeting of HRB.

Recounts studies to reduce hazards of collisions involving roadside sign structures. Design analysis techniques (camera, computer, mathematical simulation) are included.

Search terms: Photography; Collisions: (accidents); Mathematical models; Breakaway bases*; Highway signs; Impact tests; Collision tests; Computerized simulation

HS-005 264 Fld. 2/1

BREAKAWAY SIGN POSTS

by Louis J. Horn

Published in *American Road Builder* v44 n6 p26-7 (Jun 1967)

Crash tests appraise effectiveness of breakaway posts which on impact allow upward bending to clear the vehicle. Effect of wind loads on signs requires additional research.

Search terms: Breakaway bases*; Collision tests; Signs (displays); Impact tests; Wind (meteorology)

HS-005 387 Fld. 2/1

WOOD BREAK-AWAY SIGN POSTS PROVIDE ADDITIONAL SAFETY FOR MOTORISTS

Anonymous

Published in *Wood Preserving News* v43 n2 p13-5 (Feb 1965)

Reports on 15 collision incidents involving wood break-away posts. The signs were not severely damaged and were replaced with new wood posts of the same type. Only one vehicle was severely damaged. Extruded aluminum sign panels are used with the wood posts. Specifications for the posts and signs are included.

Search terms: Breakaway bases*; Signs (displays); Impact collisions; Specifications

HS-005 442 Fld. 2/7; 2/1

VEHICLE SPRAY PATTERN STUDY. FINAL REPORT.

by Jack W. Anderson; Glen C. Carlson

Minnesota. Dept. of Highways, St. Paul

17 Aug 1966 39p
Report no. Investigation-338

Prepared in cooperation with Bureau of Public Roads, Washington, D.C.

Investigates the pattern of spray from passing vehicles to determine the optimum lateral and vertical placement of milepost markers for an Interstate-type highway with wider, paved shoulders.

Search terms: Reflecting surfaces; Mud*; Road shoulders; Highway design; Daylight driving*; Vehicle spray; Night driving; Brightness; Wet road conditions; Interstate highway system; Highway signs; Visibility

AVAILABILITY: Corporate author

2/1 Breakaway Structures (Cont.)

side Environment" (CURE) program, California is installing breakaway steel sign posts based on a fractured joint system. Six steps in the program are listed. Struck fixed object accidents accounted for 48% of the fatalities on California freeways in 1966.

Search terms: Fatalities; Freeways; Breakaway bases; Highway signs; Poles (supports) California; Injury prevention; Steels; Hazards

HS-006 334 Fld. 2/4; 2/1

FULL-SCALE IMPACT TESTS ON LOW-COST BARRIER SYSTEMS, LIGHTING POLES AND SIGN SUPPORTS, 1967

by M. D. Armstrong; P. Smith; M. Wolkowicz; R. G. Jasper

Ontario. Dept. of Highways, Downsview (Canada)

Jun 1968 48p

Report no. DHO-IR22

Impact tests were made on guide-rail systems for rural highways. Vehicles hit the barrier at 50 mph at an angle of 25 degrees. An effective post and cable system could be developed from three 1/2 in. steel cables on 6 in. cedar posts at 12 ft. centers with special provisions for tensioning and anchoring the cables. More costly steel beams were not as effective. Advantages of break-away bases for lighting poles and sign supports were confirmed.

Search terms: Median barriers; Rural highways; Poles (supports); Breakaway bases; Wood; Impact tests; Steels; Highway lighting

AVAILABILITY: Corporate author

HS-006 441 Fld. 2/1

VIBRATION AND DAMPING OF ALUMINUM OVERHEAD SIGN STRUCTURES

by J. S. Lengel; M. L. Sharp

Published in *Highway Research Record* n259 p51-60 (1969) 7 refs

Overhead sign structures have occasionally been observed to vibrate in the presence of mild winds during the period before sign panels were installed. In some cases cracks were developed adjacent to welds at critical locations. In order to investigate vibration characteristics and

preventive procedures, tests were developed to: (1) measure stresses; (2) determine vibration characteristics; and (3) investigate effectiveness of vibration dampers. A single Stockbridge-type vibration damper attached to the test structure at mid-span, prevented wind vibration.

Search terms: Wind (meteorology); Damping; Signs (displays); Laboratory tests; Vibration; Stresses; Fatigue (materials); Aluminum; Poles (supports)

HS-006 442 Fld. 2/1

DYNAMIC TESTS OF FIVE BREAKAWAY LIGHTING STANDARD BASE DESIGNS

by E. F. Nordlin; W. H. Ames; R. N. Field

Published in *Highway Research Record* n259 p6-23 (1969) 16 refs

Presented at the Highway Research Board 48th Annual Meeting

California's increased emphasis on highway safety has included a concentrated effort to minimize the potential hazard of fixed objects on the roadside. Impacts into lighting standards accounted for 15 fatalities in 1967. This project determined, through full-scale dynamic impact testing, that one of the most effective breakaway device that can be used in a traffic-vulnerable lighting standard installation to reduce the severity of vehicle impacts at highway operating speeds is the multidirectional slip base.

Search terms: Lighting equipment; Breakaway bases; California; Accident prevention; Aluminum; Steels; Impact tests; Lighting design; Fatalities; Hazards

HS-006 497 Fld. 2/1

BRIDGE PARAPET TESTS CARRIED OUT IN COLLABORATION WITH THE BRITISH ALUMINIUM COMPANY

by V. J. Jehu; I. B. Laker; C. Blamey
England. Road Research Lab., Crowthorne, Berks.

1969 35p

Report no. RRL-LR-281; PB-185 977

Six full-scale impact tests were made

HS-006 331 Fld. 2/1

BREAKAWAY SIGN POSTS FOR CALIFORNIA HIGHWAYS

Anonymous

Published in *Rural and Urban Roads* p22; 62 (Jul 1969)

As part of its new "Clean Up Road-

2/1 Breakaway Structures (Cont.)

HS-006-497 (Cont.)

on designs of aluminum bridge parapets representative of structures conforming to the geometry and static loads specifications in British standards. The tests were made to find the dynamic behavior of parapets in containing and redirecting out-of-control cars and to determine the optimum spacing of posts. In all six tests the posts in the impact zone fractured at their bases, thus transferring the load to more distant posts and reducing the severity of impact. Test speeds ranged from 45 to 70 mph.

Search terms: Aluminum; Bridge design; Impact severity; Impact tests; Breakaway bases; Poles (structures); Barrier design; Guard-rail design; Design standards

AVAILABILITY: CFSTI as PB-185 977

HS-006 597 Fld. 5/10; 2/5; 2/1

SOME NEW RESEARCH ON TWO PROBLEMS CONNECTED WITH PUBLIC LIGHTING

by A. W. Christie

Published in *Public Lighting* v33 n143 p174-87 (Dec 1968) 20 refs

While street lighting reduces night accidents, this benefit may be modified by other factors, two of which are discussed. Part 1 of this paper deals with vehicle front lights for use in lighted streets. Methods of modifying headlights and sidelights to make them more suitable for driving in well-lit streets are evaluated. Dipped headlight campaigns are also discussed. Part 2 discusses lighting columns as collision hazards. It is estimated that 7% of British motor vehicle accident fatalities result from collisions with lighting columns. The development of breakaway columns and the types of road on which they should be used are discussed.

Search terms: Dimmed headlights; Fatalities; Great Britain; Accident prevention; Night driving; Street lighting; Headlights; Side lights; Lighting design; Collisions (accidents); Breakaway bases; Poles (supports); Safety campaigns; Hazards

HS-006-611 Fld. 1/3; 2/1

SINGLE-VEHICLE ACCIDENTS IN RELATION TO STREET FURNITURE

by R. L. Moore

Published in *Traffic Engineering and Control* v4 n7 p410-1, 413, 415, 417 (Nov 1962)

This study is chiefly concerned with street furniture as an obstacle to vehicles which are involved in fixed object collisions, and particularly with the problem of street-lighting columns. Lighting columns must be capable of shearing at the base to minimize the danger in single vehicle accidents. It is suggested that where accidents occur frequently, a special study should be made of the visual pattern presented to drivers. Data on fixed-object collisions in Great Britain are given. Impact tests with various lighting columns are described.

Search terms: Lighting design; Single vehicle accidents; Poles (supports); Hazards; Great Britain; Breakaway bases; Impact tests; Highway lighting; Accident location; Hazards; Accident data

2/2 COMMUNICATIONS

HS-800 071 Fld. 2/2

A PRELIMINARY ASSESSMENT OF THE HIGHWAY SAFETY COMMUNICATIONS PROBLEM
Dudley-Anderson-Yutzy,
New York

1 Nov 1968 241p
Contract FH-11-6874

Highway safety education in current practice has been analyzed. Acceptance and response of news media to promotional and educational activities has been gauged. Conclusions regarding the quality and future course of such efforts are presented. There is decreasing news coverage of highway safety education. It is recommended that highway safety information be redesigned and made more relevant in order to compete for space in the mass media.

Search terms: Highway safety, Safety programs, Safety propaganda, Safety campaigns, Mass media

AVAILABILITY: From CFSTI

HS-006 262 Fld. 5/0; 2/2

AN INTEGRATED VEHICULAR COMMUNICATIONS SYSTEM USING THE FORD RADIO ROAD ALERT

by F. Bauer

Ford Motor Co., Dearborn. Mich.

Jan 1967

Report no. SAE-670113

Presented at SAE Automotive Engineering Congress, Detroit.

Vehicle density of the nation's highways results in so much information input to the driver's eyes that the limit of his ability to perceive and react is being approached. The Ford Radio Road Alert is a method of providing information to the driver. It uses coded messages from roadside transmitters which trigger a memory storage in the vehicle and cause recorded announcements to be made through the car radio whether it is on or off. System can be used to control speed automatically, make emergency calls, guide drivers, and automate traffic flow.

Search terms: Communication systems; Electronic devices; Highway communication; Ford Motor Co.; Driving tasks; Radio communication; Visual perception; Traffic flow; Speed control;

AVAILABILITY: In Society of Automotive Engineers, HIGHWAY VEHICLE SAFETY, 1968, p553-63 (HS-006 239)

HS-004 579 Fld. 2/2

DRIVER-AID SYSTEMS FOR CONTROLLED-ACCESS RURAL HIGHWAYS. PHASE I. FINAL REPORT

by D. E. Molnar, C. B. Shields, D. D. Robinson
Battelle Memorial Inst.,
Columbus, Ohio

20 Sep 1968 214p 11ref
Revision of report dated
29 Feb 1968

Investigates need for motorist aid system on rural controlled access highways. Cost effectiveness analysis showed most likely candidate to be frequently spaced telephones; cost benefit analysis showed difficulty in quantifying benefits to be derived from a driver-aid systems.

Search terms: Motorist aid systems*, Passing aid systems, Rural highways, Highway communications, Emergency services, Telephones*, Cost data, Benefit cost analysis*, Police traffic services

AVAILABILITY: From corporate author

HS-004 677 Fld. 1/1,2/2

FREE PHONES AID MOTORISTS ON FREEWAY
Anonymous

Published in Rural and Urban Roads v7 n2 p48,49.
(Feb 1969)

This emergency communication service (700 telephone boxes serving 178 miles) provides a free service connected with the New York State Police patrol. Motorists using NETS (Northway Emergency Telephone Service) may request fire

vehicles, ambulances, towing, gasoline and tire services.

Search terms: Telephones*, Highway communication, Motorist aid systems*, Emergency services, Rural areas, Freeways, Northway Emergency Telephone Service*

HS-005 075 Fld. 4/8, 2/2

CONTINUING URBAN TRANSPORTATION STUDIES

by Austin E. Brant, Jr., Dana E. Low
Published in *Traffic Quarterly* v23 n2
p207-29 (Apr 1969)

Traffic planning, to comply with federal requirements, must be a continual process. This study presents the procedures required for the initial updating and for continuing process: street inventory, capacity studies, accident studies, travel forecasting, reporting.

Search terms: Urban areas, Transportation planning, Accident location

HS-005 388 Fld. 2/2

AN INFORMATIONAL REPORT ON ROADSIDE TELEPHONES AND EMERGENCY COMMUNICATION DEVICES FOR MOTORISTS ON INTERSTATE HIGHWAYS

American Assoc. of State Highway Officials, Washington, D.C.

1962 16p

Two basic types of communication systems for motorists on controlled access highways are: public telephones and emergency calling devices. The purposes and conditions governing their use, installation, and operation are discussed.

Search terms: Controlled access highways; Emergency services; Highway communication; Radio communication*; Telephones; Interstate highway system; Communication systems*

AVAILABILITY: Corporate author

HS-005 389 Fld. 2/2; 2/8

THEY LOOK DOWN ON HIGH-

2/2 Communications (Cont.)

HS-005-389 (Cont.)

WAYS!

Anonymous

Published in *Highway User* p30-1 (Feb 1969)

The Illinois toll highway system maintains a helicopter to patrol the freeways and assist motorists in numerous ways. It has been used chiefly for spotting trouble, and its public service functions will be increased by equipping it to serve as an ambulance.

Search terms: Helicopters; Ambulances; Illinois*; Toll roads; Highway communication; Emergency services; Police traffic services

HS-005 482 Fld. 2/2

A STUDY OF THE FEASIBILITY OF USING ROADSIDE COMMUNICATIONS FOR TRAFFIC CONTROL AND DRIVER INFORMATION. REPORT NO. 2

by Donald O. Covault; Turgut Dervish; Andrew C. Kanen

Published in *Highway Research Record* n202 p32-66 (1967) 15 refs

Presented at the 46th Annual Meeting of the Highway Research Board.

A method of driver-roadside communication was tested on the Atlanta freeway system during daytime and nighttime driving activities in 1964 and 1965. The two related studies attempted to evaluate the effectiveness of roadside radio communication on behavior of the driver as related to his execution of a diverging maneuver from a freeway traffic system. The radio system, called Hy-com, provides radio communications from the roadside to the driver and consists of a car-mounted receiver and a roadside transmitter.

Search terms: Radio communication*; Highway communication; Freeways; Traffic control devices; Driver behavior; Driver performance; Traffic data analysis; Night driving; Communication systems; Atlanta*

HS-005 483 Fld. 2/2

AN EVALUATION OF THE NORTHWAY EMERGENCY TELEPHONE SYSTEM

by Ronald W. Tweedie; John E. Taylor

Published in *Highway Research Record* n202 p67-75 (1967)

Presented at the 46th Annual Meeting of the Highway Research Board.

New York State has established a complete emergency telephone system on an interstate highway, the Adirondack Northway. The first ten months of operation have been analyzed. Types of calls are described and related to traffic volume and seasonal variation.

Search terms: Communication systems*; Highway communication; Emergency services; Telephones*; New York*; Interstate highway system; Traffic volume

HS-005 484 Fld. 2/2

CALL-STATION SYSTEM HELPS MOTORISTS IN EMERGENCIES

Anonymous

Published in *Better Roads* v36 n1 p36-7 (Jan 1966)

An emergency call box system is described. It uses voice communication, is tamper-proof, and will be useful to highway police as well as motorists.

Search terms: Emergency services; Highway communication; Motorist aid systems*; Telephones*; Communication systems*; Police

HS-005 485 Fld. 2/2

FREE EMERGENCY TELEPHONES FOR SUPERHIGHWAYS

by Ronald N. Kulikowsky

Published in *FBI Law Enforcement Bulletin* v36 n1 p2-5, 20-1 (Jan 1967)

Interim survey of the emergency communication system on the Northway freeway in New York, a part of the interstate system, emphasizes police services to motorists. Types of calls during the first eight months of

operation are outlined.

Search terms: New York*; Emergency services; Freeways; Telephones*; Highway communication; Police traffic services; Interstate highway system; Communication systems*

HS-005 486 Fld. 2/2

MOTORIST SERVICES ON LIMITED ACCESS HIGHWAYS

by Melvin J. Kohn

Published in *Traffic Engineering* v34 n6 p14-6, 56 (Mar 1964)

This article describes the variety of essential services available to the motorist on New Jersey's Garden State Parkway. Communications, disabled vehicles and aid to motorists, toll areas, road closure, lost and found activity are topics discussed.

Search terms: Highway communication; Police traffic services; Motorist aid systems*; Emergency services; Controlled access highways; New Jersey*; Disabled vehicles*

HS-005 786 Fld. 2/2

2,600 PHONE BOXES PATCH A \$1,000,000 FLAT TIRE

Anonymous

Published in *American County Government* v34 n6 p23-4, 57 (Jun 1969)

To reduce freeway accidents, help motorists in trouble, and keep traffic flowing smoothly, telephone call boxes are being installed at quarter mile intervals on the 325-mile freeway system in Los Angeles County. The calls are routed to a highway patrol or police department communications center where a dispatcher determines the location and nature of the trouble and dispatches proper equipment. Successful results show that police are accomplishing more, motorists are getting help faster, especially in the case of a serious accident, and the use of equipment is not wasted.

Search terms: Los Angeles County*; Freeways; Motorist aid systems*; Emergency services; Police traffic services; Telephones*; Accident factors

2/2 Communications (Cont.)

HS-005 787 Fld. 2/2; 5/2

BETTER SERVICE IN GREATER SAFETY

Anonymous

Published in *School Bus Fleet* v14 n3 p24-6 (Jun-Jul 1969)

Two-way radio promotes efficiency and safety for school bus companies in Chicago. Examples of its usefulness are given.

Search terms: School buses; Chicago*; Radio communication*

HS-005 827 Fld. 2/2

COMMUNICATION WITH STRANDED MOTORISTS ON CALIFORNIA URBAN FREEWAYS

by A. Kuprijanow

Airborne Instruments Lab., Deer Park, N. Y.

Aug 1967 75p

Report no. AIL-3097-1

Prepared for California Div. of Highways, Sacramento.

Examines what steps the state should take in providing communications. Recommends increased police patrol activity to detect stranded cars, rapid availability of service equipment responding to calls, installation of additional emergency telephones as an interim solution, and the establishment of an ideal emergency communications system based on high patrol frequency, together with CB receivers and monitoring equipment in each police vehicle. Recommendations are based on study of the problem in San Francisco and Los Angeles.

Search terms: Motorist Aid Systems*; California*; Communication systems*; Police traffic services; Telephones*; Emergency services; Emergency vehicles; Los Angeles*; San Francisco*; Disabled vehicles*; Radio communication; Highway communication; Freeways; Urban highways; Driver aid, Information and Routing*; Telecommunication; Detectors; Mathematical models; Vehicular communication

AVAILABILITY: Corporate author

HS-005 828 Fld. 2/2

COMMUNICATION WITH STRANDED MOTORISTS

by Victor D. Graf; Norman C. Wingerd

California. Div. of Highways, Sacramento

Jan 1968 13p

A summary and evaluation of a report on this subject prepared for the California Division of Highways by Airborne Instruments Laboratory. Discusses what steps the state should take in providing communications. Suggests that primary objective should be maintaining the service level of freeways, and discusses emergency telephones, police patrols, radio call boxes, service equipment, and other aspects of a communications system. Portable communication requiring vehicular equipment appears the best solution.

Search terms: Communication systems*; Police Traffic services; California*; Telephones*; Emergency services; Emergency vehicles; Highway communication; Freeways; Urban highways; Disabled vehicles*; Radio communication*; Vehicular communication; Motorist aid systems*

AVAILABILITY: Corporate author

HS-005 942 Fld. 2/2

COMMUNICATION WITH THE STRANDED MOTORIST: SOME PRACTICAL CONSIDERATIONS

by Victor D. Graf; Norman C. Wingerd

Published in *Traffic Digest and Review* v17 n7 p11-3 (Jul 1969)

Primarily based on Airborne Instruments Laboratory of Long Island, N.Y. report No. 3087-1, "Communication with Stranded Motorists on California Urban Freeways." (see HS-005 827)

An ideal system is described which provides for maximum safety to the disabled motorist, maximum effectiveness of the police patrol, ultimate applicability to any urban and possibly rural environments, relatively low cost to the motorist and the state, and effectiveness for equipped

and unequipped vehicles. Reasons given for disablement of cars include out of gas, oil, or water; tire problems; vapor lock; and mechanical failures. It is also suggested that improvements be made by the auto industry to eliminate these failures.

Search terms: California*; Los Angeles County*; Costs*; Communication systems*; Emergency equipment*; Telephones*; Radio communication*; Emergency services; Emergencies*; Disabled vehicles*; Drivers

HS-006 443 Fld. 2/2

RESPONSE TO A CB RADIO DRIVER AID NETWORK

by Herbert J. Bauer; Alger F. Malo; Clark E. Quinn

General Motors Research Labs., Warren, Mich.

22 Nov 1968 39p 5 refs

Report no. GMR-814

To be presented at annual meeting of the Highway Research Board, Jan. 15, 1969.

Detroit's General Motors-sponsored Citizens Band Radio Driver Aid Network substantially fulfills the needs of a roadway surveillance system. 112 volunteers, whose cars were equipped with mobile citizens band transceivers, reported accidents, vehicle-caused and non-vehicle caused traffic flow interferences, hazardous roadway conditions, and public equipment or utilities failures. Reports were transmitted to a base station operator for referral to appropriate authority, and also recorded on cards. The cards were later processed for analysis and research data. History and development of the network are given.

Search terms: General Motors Corp.; Traffic data analysis; Detroit; Radio communication; Traffic flow; Hazards; Traffic surveillance; Highway communication; Emergencies

AVAILABILITY: Corporate author

HS-006 667 Fld. 2/2

A SYSTEMS ANALYSIS OF HIGHWAY COMMUNICATIONS. VOL. 1. FINAL REPORT

2/2 Communications (Cont.)

HS-006-667 (Cont.)

Communications and Systems, Inc.,
Paramus, N.J.

20 Sep 1968 362p 34 refs
Contract FH-11-6328
Report no. C&S-68-TR-2859; PB-179
987

A systems analysis of the use of communications was made and a communications model was developed, allowing evaluation of the performance that could be expected of a specific communication system. Material is included to introduce highway engineers to the technologies of communication engineering. Anticipated uses of communications and computers in traffic control are discussed.

Search terms: Systems analysis; Highway communication; Communication systems; Computers; Computer programs; Queueing theory; Costs; Mathematical models; Traffic control

AVAILABILITY: CFSTI

HS-006 668 Fld. 2/2

A SYSTEMS ANALYSIS OF HIGHWAY COMMUNICATIONS. VOL. 2. SUPPLEMENTARY MATERIAL TO FINAL REPORT

Communications and Systems, Inc.,
Paramus, N.J.

20 Sep 1968 297p
Contract FH-11-6328
Report no. C&S-68-TR-2860; PB-179
988

This volume displays activities found in each computer subfunction together with computer printouts of subfunction information exchanges. The subfunctions are grouped into 73 subjects relating to highway communications, traffic control, and related areas.

Search terms: Systems analysis; Highway communication; Communication systems; Computers; Traffic control; Computer programs

AVAILABILITY: CFSTI

HS-006 720 Fld. 2/2

NEW YORK STATE EMERGENCY CALL SYSTEM

by C. H. Lang
Published in *American Highways* v48
n3 p3, 10-2 (Jul 1969)

The Northway Emergency Telephone System on an interstate highway in New York is described. It is contrasted with a radio communications system used by the New York State Thruway Authority. Costs, types of assistance provided are discussed. No ideal highway communications system yet exists.

Search terms: Interstate highway system; New York (State); Highway communication; Radio communication; Costs; Disabled vehicles; Telephones; Emergency services

HS-006 171 Fld. 2/2

PLANNING FOR HIGHWAY COMMUNICATION

by Wayne Rash

Published in *Public Safety Systems*
v34 n4 p12-3 (Jul/Aug 1969)

Excerpt from paper presented at a meeting of the American Association of State Highway Officials.

A few of the traffic control and communication devices that will be used in the next ten years are listed. Planning for highway communications should include planning for state government communications.

Search terms: Communication systems*; Costs*; Highway planning; Highway communication; Radio communication*

HS-005 075 Fld. 4/8, 2/2

CONTINUING URBAN TRANSPORTATION STUDIES

by Austin E. Brant, Jr., Dana E. Low

Published in *Traffic Quarterly* v23 n2
p207-29 (Apr 1969)

Traffic planning, to comply with federal requirements, must be a continual process. This study presents the procedures required for the initial updating and for continuing process: street inventory, capacity studies, accident studies, travel forecasting, reporting.

Search terms: Urban areas, Transportation planning, Accident location

HS-006 261 Fld. 5/0; 2/2

A COMMUNICATION SYSTEM FOR DRIVER AID, INFORMATION, AND ROUTING

by Eugene A. Hanyasz

General Motors Research Labs.,
Warren, Mich.

Jan 1967 5 refs
Report no. SAE-670111

Presented at SAE Automotive Engineering Congress, Detroit.

A new concept in communications for the motorist called DAIR for Driver Aid, Information, and Routing is described. DAIR automatically gives routing instructions, communicates traffic signs and roadside messages, and provides a radio link to call for emergency assistance or information.

Search terms: Highway communication; Communication systems; Electronic devices; Traffic signs; Driver Aid, Information and Routing System; Radio communication; Highway signs; Audio-visual aids

AVAILABILITY: In Society of Automotive Engineers, HIGHWAY VEHICLE SAFETY, 1968, p546-52 (HS-006 239)

HS-006 218 Fld. 2/2

A REVIEW OF HIGHWAY EMERGENCY COMMUNICATIONS

by A. E. Johnson

Published in *Traffic Digest and Review* v17 n6 p3-6 (Jun 1969)

Based on a talk presented at the 56th National Safety Congress.

Electronic highway communication facilities for emergency use are discussed. Some factors to be considered before installation of a service are reliability, cost, need, ease of use. Locations of existing and proposed systems are listed. Some problems which have been encountered are enumerated.

Search terms: Electronic devices; Highway communication; Telephones; Communication systems; Costs

2/3 DEBRIS HAZARD CONTROL AND CLEANUP

HS-004 533 Fld. 2/3

GUIDELINES FOR CURE PROJECTS
by Ralph K. Lang,
J. B. Derby
California. Div. of Highways,
Sacramento

Oct 1967 31p
Revision of report dated
Aug 1967

CURE ("Clean Up the Roadside Environment") is a program designed to provide a clean roadside recovery area for motorists who stray from the standard highway. Projects should be a minimum of 5 miles. Top priority hazards are: guardrails, roadside sign posts, light standards, trees.

Search terms: Hazards, Traffic safety, Safety programs, Highway design, California*, Accident prevention, CURE (Clean up the Roadside Environment)*, Guardrails, Highway signs, Trees (plants)

HS-004 773 Fld. 4/1, 2/3

GUIDE TO TRANSPORTATION OF EXPLOSIVES AND OTHER DANGEROUS ARTICLES INCLUDING DRIVER'S GUIDE
Private Carrier Conference, Inc., Washington, D. C.

1966 45p
Includes revision sheet dated 16 Jan 1967

Interprets safety regulations concerning motor vehicle transport of dangerous articles: explosives, flammables, poisons, oxidizing materials, ammunition, chemicals or other articles requiring special handling, labels or placards.

Search terms: Carriers, Motor vehicles, Hazardous materials*, Regulations, Safety measures, Highway safety

AVAILABILITY: From corporate author \$2.50

HS-004 947 Fld. 4/1, 2/3

DANGEROUS ARTICLE HANDLING; A GUIDE FOR THE PROPER HANDLING AND TRANSPORTATION OF DANGEROUS ARTICLES BY MOTOR CARRIER
Arizona Highway Dept.,
Phoenix

Apr 1968 70p
Revision of report dated Nov. 1967. Includes fire control and emergency procedure in case of accident.

Purpose of this manual is to assist motor carriers to hold to a minimum difficulties which arise in the transportation of articles listed as dangerous in the Interstate Commerce Commission's regulations on transportation of explosives and other dangerous articles. Manual is amended to include fire control and emergency procedure in case of an accident. Dangerous articles are classified and listed, labeling and marking requirements outlined, loading and unloading procedures explained.

Search terms: Hazardous materials*, Trucks, Regulations, Explosives*, Fire safety, Accident protection, Hazards, Cargo transportation, Truck accidents, Safety measures, Interstate Commerce Commission*

AVAILABILITY: From corporate author

HS-004 974 Fld. 4/1, 2/3

SAFETY PROCEDURES TO BE USED TO PROTECT THE PUBLIC IN CASE OF ACCIDENTS INVOLVING ROCKET PROPELLANT CHEMICALS. LIST AND METHODS
Arizona. Highway Dept.,
Phoenix

28 Dec 1967 18p
Compiled by City of
Phoenix Fire Dept. Training
Section.

Contains a list and index

of chemicals, a glossary of terms, and a table of rocket propellant chemicals giving name, formula, synonym, class, toxicity, fire hazard and fire control procedures, and shipping regulations.

Search terms: Accident protection, Hazardous materials*, Fire prevention, Fires, Fire protection, Cargo transportation, Tanks (containers), Trucks, Rocket propellants*

AVAILABILITY: From corporate author

HS-820 050 Fld. 2/3

HIGHWAY SAFETY PROGRAM MANUAL. VOLUME 16. DEBRIS HAZARD CONTROL AND CLEANUP

National Highway Safety Bureau,
Washington, D.C.

Apr 1969 56p 16 refs

One of 17 volumes, two of which (vols. 12 and 13) are as yet unissued (see HS-820 036 to HS-820 050).

The complete manual supplements the Highway Safety Program Standards and presents additional information to assist State and local agencies to implement their highway safety programs. This volume is concerned with the program to provide for the prompt removal of damaged or disabled vehicles from the crash site and for the cleanup of any dangerous spillages resulting from crashes or other mechanical breakdowns of vehicles on public thoroughfares.

Search terms: Highway safety; Safety programs; State government; Local government*; Debris removal; Hazards; Disabled vehicles*; Hazardous materials*

AVAILABILITY: Federal Highway Administration, Washington, D.C. 20591, Attn: Records Management Branch. \$2.75

HS-006 371 Fld. 5/10; 2/3

EMERGENCY WARNING SIGNS FOR VEHICLES

2/3 Debris Hazard Control and Cleanup (Cont.)

HS-006-371 (Cont.)

by V. J. Jehu

Published in *Traffic Engineering and Control* v4 n2 p92-5 (Jun 1962)

Accident records in Great Britain show that 3% of all injury accidents are caused by collisions with or in the presence of disabled vehicles and previous accidents. This paper discusses portable light sources versus reflectorized signs, daylight visibility of triangular signs, size of signs, stability of signs in high winds, location of signs, emergency rear lights, and the relative merits of signs and vehicle lights. The triangular signs used in Europe are more reliable than portable lamps.

Search terms: Motor vehicle lighting; Reflecting surfaces; Warning systems; Accident causes; Signal devices; Visibility; Signs (displays); Europe; Accident protection; Emergency equipment; Disabled vehicles; Wind (meteorology); Hazards; Rear lights; Lamps; Great Britain; Accident records

HS-006 583 Fld. 4/1; 1/1; 2/3

HIGHWAY TRANSPORTATION OF EXTRA-HAZARDOUS COMMODITIES: SUGGESTED GUIDE FOR STATE ACTION ON SAFETY FROM FIRE, EXPLOSION AND HEALTH HAZARDS

American Insurance Assoc., New York

1966 24p 21 refs

This guide is designed to promote valid and uniform highway safety controls; to minimize the hazards accompanying the transportation of certain dangerous materials; and to safeguard the public and communities along the nation's traffic arteries against the possibility of a major disaster resulting from fire, explosion, and accidental release of toxic or poisonous substances. The guide is presented for state enactment of a "Transportation of Extra-hazardous Commodities Act."

Search terms: State government; Fires; Disasters; Safety laws; Hazardous materials; Highway transportation; Regulations; Motor

vehicle inspection; Safety measures; Health hazards; Motor carriers; Cargo transportation

AVAILABILITY: Corporate author

2/4 DESIGN & CONSTRUCTION

HS-004 304

COLLAPSE OF U.S. 35
HIGHWAY BRIDGE, POINT
PLEASANT, WEST VIRGINIA,
DECEMBER 15, 1967. HIGHWAY
ACCIDENT REPORT.

National Transportation
Safety Board, Washington,
D.C.

4 Oct 1968 86 p.
SS-H-2

AVAILABILITY: From
corporate author

Describes bridge disaster
in which 46 were killed.
Presents 25 conclusions,
mostly describing sequence
of the disaster. Cause of
collapse is not yet establish-
ed. Bridge had not been
completely inspected for
16 years. Recommends better
standards for bridge safety.
A final report will be
issued by the National
Transportation Safety Board
giving probable cause of
the collapse, conclusions,
and further recommendations.

HS-004 308 2/4; 4/8

CONGESTION ANALYSIS-SPEED
DELAY STUDY, US99W--I-5,
PORTLAND OREGON

Oregon. State Highway Dept., Salem.
Traffic Engineering Div.

Dec 1965 15p

Study shows improvements in traffic
congestion, vehicle travel time, and
accident records due to a freeway
relieving near capacity traffic
conditions on a highway. "Before"
and "after" conditions and maps of
the system are given.

Search terms: Traffic congestion;
Travel time; Speed; Accident
records; Freeways; Highway usage

AVAILABILITY

HS-004 345 Fld. 2/4; 3/12

ADAPTING THE HIGHWAY TO THE
HUMAN ELEMENT

by Richard M. Michaels

Bureau of Public Roads, Washington,

D.C.

Published in *Highway Research
Record* n79 p56-7 (1965)

Presented at the Highway Research
Board 44th annual meeting, Jan
1965

Environmental conditions which cause
safety problems can be discerned
without waiting for a location to pile
up accident records. Among the
problems are: restriction of driver's
view ahead or other constraints within
visual field; frequency of large speed
differences; inadequate gaps for
turning, crossing, or passing; complex
or uncertain information sources that
cause drivers to slow down to read
them.

Search terms: Accident causes;
Highway design; Driver vision;
Speed; Turning (direction change);
Passing (driving); Crossings; Signs
(displays); Accident prevention;
Driving conditions

HS-004 347 Fld. 2/4; 3/12

LINEMARKING TO RESTRICT
OVERTAKING ON CURVES.

by J. C. Turner

Published in *Conference of the
Australian Road Research Board* v3 pt
1 p552-569 (1966)

The New South Wales Department of
Main Roads has undertaken a study to
determine the necessary sight distances
for overtaking and methods of
linemaking. Acceptance of any system
of separation linemaking depends on
drivers. Speeds and distances for
overtaking and passing safety are
discussed.

Search terms: Overtaking (driving);
Road curves; Visual perception;
Driver behavior; Speed; Lane lines

HS-004 348 Fld. 2/4; 3/12

TRAFFIC CONTROL & ROADWAY
ELEMENTS--THEIR RELATIONSHIP
TO HIGHWAY SAFETY. REVISED.
CHAPTER 1. RAILROAD GRADE
CROSSINGS

by Hoy A. Richards, G. Sadler Bridges
Texas A. and M. Univ., College Station
Texas Transportation Inst.

1968 11p

Discusses accident problem at grade
crossing and outlines Department of
Transportation safety program
intended to cut toll of 14,000 annual
accidents. Selected hazard index
formulas, relative hazard relationships
for protective devices at railroad grade
crossings, and required design sight
distances for combinations of highway
and train vehicle speeds are presented.

Search terms: Accident risks; Grade
crossings (highways); Railroad grade
crossings; Railroads; Safety
programs; Speed; Visual perception

AVAILABILITY: Automotive
Safety Foundation

HS-004 404 Fld. 2/4

700,000 BRIDGES TO INSPECT--
CAN WE HANDLE IT?

by John J. Hassett

Published in *Rural & Urban
Roads* v6 n9 p42-3,46,49
(Sep 1968)

Concern for bridges has
increased since the disaster
at Point Pleasant Bridge
on the Ohio, killing two
dozen people. The respon-
sibility for inspecting
bridges is widely divided.
Railroads are responsible
for 192,000 bridges which
are inspected at least yearly.
The half million highway
bridges are the responsi-
bility of state agencies,
cities, townships, county
units, toll authorities.
Some are rarely inspected.
Lists nine elements which
should be checked out for
each inspection and suggests
that inspections should be
made by engineers.

Search terms: Bridges,
Inspection, Disasters,
Highway bridges, Railroad
bridges, State government,
Local government

2/4 Design & Construction (Cont.)

HS-004 459 Fld. 2/4

THE EFFECT OF MAJOR PHYSICAL IMPROVEMENTS ON CAPACITY AND SAFETY

by Warren A. Frisk

Published in Traffic Engineering v39 n3 p14-20 (Dec 1968)

Study in Springfield, Illinois indicates that installation of curbed medians and intersection channelization will pay dividends far exceeding the original cost, mainly by substantially reducing accidents and increasing capacity.

Search terms: Highway safety, Accident rates, Traffic capacity, Lane lines, Median barriers, Intersections, Illinois

HS-004 473 Fld. 2/4

PAVEMENT REFLECTANCE VERSUS ROAD SURFACE STRUCTURE

by Charles A. Pagen, Thomas V. Snider
Ohio State Univ., Columbus.
Engineering Experiment Station

Jul 1967 54p
Report no. EES-262B-1

Investigates quantitative methods relating the roughness characteristics of highway surfaces to the ability of the surface to reflect the optimum amount of light back to a driver and also to the skid resistance of the pavement. Eventually a skid criterion for determining an unsafe highway surface may be developed. Tests are also applicable to airport runway surfaces.

Search terms: Highway surfaces, Runways, Skid resistance, Skid resistance tests, Bituminous concretes, Portland cements, Reflectance, Surface treatments

AVAILABILITY: From corporate author

HS-004 474 Fld. 2/4

TWENTY-FIFTH SHORT COURSE ON ROADSIDE DEVELOPMENT HELD OCTOBER 3-7, 1966
Ohio State Univ., Columbus.
Dept. of Landscape Architecture and Ohio. Dept. of Highways, Columbus

Oct 1966 223p

"Expanding Horizons" is the theme for this lecture seminar. The major problems of designing beauty into an almost cancerous expansion of urban & rural freeways and expressways are considered. The goal is the total highway designed for economy, safety and beauty.

Search terms: Highway design, Highway safety, Rest areas, Beautification, Landscape design, Waste disposal, Sanitation, Urban areas, Rural areas, Cost-benefits

AVAILABILITY: From Wilbur J. Garmhausen, Chief Landscape Architect, Ohio Dept. of Highways, Columbus, Ohio 43215. (Includes HS-004 475-004 476)

HS-004 475 Fld. 2/4

EXPANDING HORIZONS. PRE-SIDING REMARKS

by C. B. Harris, Jr.
Du Pont de Nemours (E. I.) and Co., Western Springs, Ill.

Oct 1966 3p

The use of chemicals for roadside vegetation control has increased greatly in recent years. Advantages from chemical application to control weeds and brush are: lower maintenance costs, snow removal aid, reduced fire hazards from dry weeds adjacent to woodlands, and making roads safer for travel by improving visibility.

Search terms: Weed control, Herbicides, Highway maintenance, Visibility, Fire safety

AVAILABILITY: In Ohio State Univ., Columbus. Dept. of Landscape Architecture
Twenty-Fifth Short Course on Roadside Development p4-6 (HS-004 474)

HS-004 476 Fld. 2/4

LANDSCAPE DEVELOPMENT AND HIGHWAY SAFETY
by Jack E. Burton
Michigan. Dept. of State Highways, Lansing
In an effort to reduce accidents, the "Safety Tree Removal Program" was initiated in Michigan. Features are: new plantings are not closer than 40 feet to the roadway; two-lane & secondary trunklines were surveyed for dangerous tree conditions. Roadside vegetation should enhance not only the appearance but also the safe operation of the highway.

Search terms: Highway safety, Beautification, Trees (plants), Accident reduction, Michigan, Safety programs, Vegetation

AVAILABILITY: In Ohio State Univ., Columbus. Dept. of Landscape Architecture
Twenty-Fifth Short Course on Roadside Development p60-2 (HS-004 474)

HS-004 534 Fld. 2/4

HIGHLIGHTS OF THE ILLINOIS HIGHWAY CONFERENCE

by V. J. Brown

Published in Rural and Urban Roads v4 n5 p34-6 (May 1966)

Describes a conference held at the University of Illinois, devoted to functional classification of highways. Outlines basic highway functions, classification guidelines, federal planning requirements, urban transportation goals, state planning of highway needs, the impact of interstate roads on Illinois counties, and highway financing problems.

Search terms: Highway costs, Highway planning, Highway construction,

2/4 Design & Construction (Cont.)

HS-004-534 (Cont.)

State government, Local government, Federal control, Urban planning, Classifications, Transportation planning, Financing

HS-004 535 Fld. 2/4

HIGHWAY DESIGN AND OPERATIONAL PRACTICES RELATED TO HIGHWAY SAFETY. A REPORT OF THE SPECIAL AASHO TRAFFIC SAFETY COMMITTEE
American Association of State Highway Officials, Washington, D. C.

Nov 1966 76p

The Special Traffic Safety Committee of AASHO viewed highway facilities in various sections of the country to determine aspects of design and operation which need correcting to enhance safety. This report details the resulting findings, discussions, comments, and recommendations.

Search terms: Highway design, Highway maintenance, Safety measures, Traffic control devices, Surveys, Interstate Highway System, Accident prevention

AVAILABILITY: From corporate author

HS-004 536 Fld. 2/4,4/1

THE HIGHWAY SPOT IMPROVEMENT PROGRAM: A CRITICAL REVIEW
by Daniel J. Minahan
Michigan Univ., Ann Arbor.
Highway Safety Research Inst.

[Dec 1967] 93p 77refs
Report no. PhF-2
Includes a chronological digest of federal aid for highways from the 1700's to 1966

This study undertakes a critical review of the National Highway Spot Improvement Program and examines technical,

administrative, operational and economic factors. A continued research and development program is recommended in the areas of accident reporting, benefit-cost analysis, highway design, to obtain stated objectives.

Search terms: Highway design, Safety programs, Accident locations, Accident reports, State governments, United States Government, Legislation, Spot improvement program*, Highway design, Hazards, Local governments

AVAILABILITY: From corporate author

HS-004 537 Fld. 2/4

HIGHWAYS ENGINEERED FOR TODAY'S SAFETY NEEDS
by Robert Dymont

Published in Rural and Urban Roads v4 n8 p18-9,52
(Aug 1966)

Describes activities of New York State Department of Public Works in achieving safer roads, including study of travel patterns, highway design, landscaping of roads, lane marking, use of signs, experiments with colored paving materials.

Search terms: Highway engineering, Safety engineering*, Highway design*, Travel patterns, Landscape design*, Lane lines*, Pavements, Signs (displays), Highway safety

HS-004 538 Fld. 2/4

ON REUSABLE ENERGY ABSORBING HIGHWAY PROTECTIVE SYSTEM FOR MEDIAN AREAS. FINAL REPORT
Aerospace Research Associates, Inc., West Covina, Calif.

Jun 1968 205p
Contract FH-11-6736
Report no. ARA-96, PB-180 079

Removal and replacement of hazardous highway elements is

more expensive than the installation of a reusable energy absorption highway protective barrier system (protecting both vehicle and occupant). This report summarizes research and development undertaken to design, fabricate, and dynamically test the complete highway protective system for median areas.

Search terms: Highway design, Hazards, Medians (dividers), Tor-shoks*, Roto-shoks*, Barriers, Energy absorption, Crash research, Guardrail design, Shock absorbers

AVAILABILITY: From CFSTI as PB 180 079

HS-004 539 Fld. 2/4,3/1

RESEARCH ON ROAD SAFETY
by D. J. Lyons

Published in Journal of the Institution of Municipal Engineers v95 n9 p278-282
[1968]

Cost benefit concepts are being used in Great Britain in formulating research programs and evaluating the success of work undertaken. The cost of determining the effects of alcohol on driving was small, and the resulting legislation has reduced deaths and injuries considerably. Discusses research underway in skid prevention, crash barrier design, road junction design, standardized front lighting of vehicles, driver psychology and reactions.

Search terms: Accident prevention, Costs, Alcoholism, Drinking drivers, Injury prevention, Legislation, Great Britain*, Fatalities, Skidding, Barrier design, Intersections, Headlights, Lighting design, Driver behavior, Psychology, Reactions (physiology), Cost effectiveness*, Costs

HS-004 540 Fld. 2/4,5/22,4/5

SKIDDING AND SKID RESISTANCE.

2/4 Design & Construction (Cont.)

HS-004-540 (Cont.)

A REVIEW OF THE LITERATURE
by Thomas I. Csathy
Ontario. Dept. of Highways,
Downsview (Canada)

Mar 1964 87p 432 refs
Report no. 46

The six sections of this literature review cover general problems of vehicle skidding; practical methods of measuring pavement friction, skid resistance; influencing factors associated with road and with vehicle; and practical means of preventing skidding accidents.

Search terms: State of the art studies, Skidding, Skid resistance, Road surfaces, Tires, Tread wear, Speed, Antiskidding devices, Bibliographies, Accident prevention, Skid resistance--Bibliography*, Measurement

AVAILABILITY: From
corporate author

HS-004 580 Fld. 2/4

ROADWAY SURFACE CLASSIFICATION

by L. Ellis King,
D. M. Finch

Published in Illuminating Engineering v63 n12 p627-34 (Dec 1968)

Presented at the National Technical Conference of the Illuminating Engineering Society, Phoenix, Ariz., 9-12 Sep 1968

Motor vehicle safety requires that driver be able to perceive hazards, which is directly related to the luminances and contrasts in the driver's visual field. Roadway luminance is probably the most important of these. A reflectometer for measuring the directional reflectance factors for pavement samples is described and data on several samples given. Three procedures for fitting polynomial equations to the data have been tried and reported.

Search terms: Reduced

visibility, Obstructions, Measuring instruments, Luminance, Motor vehicle safety, Road surface tests, Pavement surface texture, Statistical analysis, Hazards, Photometry

HS-004 628 Fld. 2/4

COMPUTER PROGRAM FOR ANALYSIS AND DESIGN OF SIMPLE-SPAN PRECAST PRESTRESSED HIGHWAY OR RAILWAY BRIDGES

by Clifford L. Freyermuth

Published in Journal of the Prestressed Concrete Institute v13 n3 p28-39 (Jun 1968)

The computer program applies to various types of prestressed units on simple spans, either with or without a composite deck. Based on conventional design procedures, the program mechanizes all the routine calculations and provides a sizeable reduction in design time and cost.

Search terms: Highway bridges*, Railroad Bridges* Bridges (structures), Bridge design, Computer programs

HS-004 629 Fld. 2/4

GROOVES TO END SKIDDING

Anonymous

Published in Rural and Urban Roads v4 n8 p50-1 (Aug 1966)

Describes machines which are used to cut grooves half an inch apart in yard-wide swaths, 0.125 inch deep. Grooving operation was carried out on a Georgia highway where there was a high accident rate because of hydroplaning in wet weather.

Search terms: Skidding accidents, Skid resistance, Highway construction, Grooving*, Wet road conditions, Highway surfaces, Accident rates, Georgia*, Wet skidding

HS-004 630 Fld. 2/4

PLAIN CONCRETE PAVEMENT CAN BE ECONOMICAL

by Dayton Cook

Published in Rural and Urban Roads v4 n3 p35,37,39 (Mar 1966)

Condensed from presentation to American Public Works Association, Roanoke, Va.

City of Alexandria, Virginia, plans to build more streets of plain concrete and asphalt on soil cement base, and less asphalt on soil aggregate base. Maintenance cost is reasonable if two common faults with concrete are avoided: too much water and not enough air in the mix. Proper installation is also necessary to avoid poor results.

Search terms: Highway costs, Streets, Virginia*, Highway construction, Concrete pavements, Asphalt pavements*, Soil cement*, Soil aggregates*, Maintenance

HS-004 631 Fld. 2/4

RESEARCHERS TAKE DEATH OUT OF DRIVING

Anonymous

Published in Engineering News-Record p24,29 (9 Jan 1969)

Reports briefly on projects of the Texas Transportation Institute. Highway safety principles followed are: clear the right-of-way; if it can't be cleared, make obstructions break away; if they can't break away, protect them with impact attenuation devices.

Search terms: Highway design, Energy absorption, Impact protection, Right-of-way (land)*, Breakaway bases*, Texas*, Texas Transportation Inst.*

HS-004 632 Fld. 2/4,2/9,2/7

STUDY OF ELECTRICALLY HEATED BRIDGE DECKS FOR ICE PREVENTION

by H. D. Butler

2/4 Design & Construction (Cont.)

HS-004-632 (Cont.)

Texas. Highway Dept.,
Austin

Mar 1968 80p
Contract 1-5-63-72
Report no. RR-72-1-F

Reports the design, construction, and study of 3 electrical heating systems to prevent ice and snow formation on bridges. Systems were found to be feasible and economical. Additional research is required to study the relationship between slab thickness and heat distribution.

Search terms: Bridge decks*, Bridge design, Ice prevention*, Ice removal, Electric heating*, Snow removal, Concrete pavements, Texas*, Cost data

AVAILABILITY: From
corporate author

HS-004 689 Fld. 2/4

THE JOINT USE CONCEPT AND
URBAN FREEWAY DEVELOPMENT
by David R. Levin

Published in Appraisal
Journal v36 n3 p408-13
(Jul 1968)

The Bureau of Public Roads has developed a plan for the joint use and cooperative development of urban freeways simultaneously with the provision of other needed urban accommodations. Slum housing and blighted commercial areas can be replaced with new construction under freeways or in the air space across them. It is also cheaper when entire city blocks are acquired at the same time and all the improvements made simultaneously.

Search terms: Urban planning, Freeway planning, Urban renewal*, Bureau of Public Roads*, Land multiple use*, Highway costs

HS-004 690 Fld. 2/4

WHAT'S WRONG WITH THE BEST
HIGHWAYS IN THE WORLD? A
CRITICAL APPRAISAL OF
OPERATIONAL FEATURES OF
THE INTERSTATE SYSTEM, AS
OBSERVED FROM THE DRIVER'S
SEAT

by Charles W. Prisk

Published in Public Works
v97 n5 p127-9 (May 1966)

A critical appraisal of operational features of the interstate system, as observed from the driver's seat. Comments particularly on pavement drainage, shoulder conditions, medians, curbs, need for simpler interchanges and access corrections, better signs and sign supports.

Search terms: Curbs*, Interstate highway system, Highway design, Highway drainage, Road shoulders, Medians (dividers), Interchanges, Signs (displays), Access control, Poles (supports)

HS-004 751 Fld. 2/4

RECENT DEVELOPMENTS IN
BARRIER DESIGN
by R. L. Moore,
V. J. Jehu

Published in Traffic
Engineering and Control
v10 n8 p421,423-5,427-9
(Dec 1968) 15 refs

Barriers previously thought to be satisfactory have been tested and ways recommended in which they can be made more effective. Eight conclusions on barrier design are presented. "Running off road" accidents should be studied to determine why they happen, how many there are, what paths the vehicles take, what objects they hit, how these accidents can be reduced, what types of vehicles are involved, and what kinds of barriers are involved.

Search terms: Signal vehicle accidents, Barrier design, Accident

causes, Accident rates, Collisions (accidents), Accident research, Accident prevention, Benefit cost analysis

HS-004 752 Fld. 2/4

SAFETY EVALUATION OF RAIL-
ROAD GRADE CROSSING
by H. L. Arno

Published in Public Works
v99 n12 p71-2 (Dec 1968)

Brief report of a study to provide the necessary basic information for the improvement of safety conditions at public rail-highway crossings in Texas.

Search terms: Railroad grade crossing*, Crossings, Railroads, Signal devices, Texas*, Safety design, Poles (supports)

HS-004 753 Fld. 2/4

"TEXAS CRASH CUSHIONS"
HELP SAVE LIVES
by Tom H. Taylor

Published in Traffic
Digest and Review v17 n1
p5-8 (Jan 1969)

These new devices are called "vehicle impact attenuators" or "crash cushions". Consisting of a group of interlocked steel barrels which are successively crushed when hit by a speeding automobile, they are located in front of the concrete parapets where a highway divides, absorbing the momentum of a colliding car. Use in front of bridge piers and as supports for heavy signs recommended.

Search terms: Highway safety, Impact protection, Barrier collisions, Vehicle impact attenuators*, Energy absorption, Texas*

HS-004 754 Fld. 2/4

VEHICLE IMPACT ATTENUATORS
FOR BIFURCATIONS
by Bill Barron

2/4 Design & Construction (Cont.)

HS-004-754 (Cont.)

Published in Texas Highways
v15 n12 p3-7 (Dec 1968)

This device, also called Texas crash cushions, consists of a honeycomb of 55-gallon drums placed at Y-shaped intersections on freeways to absorb the impact from errant vehicles. Drivers had been running into concrete parapets despite the use of warning devices. The barrels stop a car with little damage, and cost about \$200, much less than many other devices.

Search terms: Vehicle impact attenuators*, Energy absorption, Impact protection, Highway safety, Warning systems, Texas*

HS-004 766 Fld. 3/11,2/4

THE CARE AND HANDLING OF PEDESTRIANS
by Arthur D. Bird

Published in Public Safety Systems v33 n4 p10-2
(Jul-Aug 1968)

Pedestrians are essential to central business districts, but most of the planning concentrates on vehicular access. It is more difficult to provide safe, comfortable, and rapid progress for pedestrians and prevent conflicts between vehicles and pedestrians. Suggests a coordinated traffic signal system with phasing to favor pedestrian movements where possible, signalized mid-block crosswalks, one way streets and restricted turning, and wider sidewalks. Other concepts such as moving sidewalks and pedestrian overpasses and underpasses are also discussed.

Search terms: Central business districts, Urban planning, Pedestrian safety,

Traffic flow patterns, Traffic signals, Crosswalks, One way streets, Turning (direction change), Sidewalks, Overpasses*, Underpasses*

HS-004 772 Fld. 3/12,2/4

SIGHT DISTANCE ON RURAL TRUNK ROADS
by H. C. Hall

Published in Highways and Public Works v36 n1705
p52-4, 56-7 (Sep 1968)

Sight distance was measured on six roads in England and Wales and was found to be less than that recommended for new roads. The overtaking sight distance is twice the overtaking distance to allow for the effect of oncoming vehicles. Design speed is also discussed.

Search terms: Visibility, Overtaking (driving), Visual perception, Great Britain*, Rural highways, Road design speed, Highway design

HS-004 809 Fld. 2/4

MEASUREMENTS OF SKIDDING RESISTANCE ON THREE GERMAN AUTOBAHNS--SEPTEMBER 1967
by F. T. W. Lander, F. A. Jacobs
Road Research Lab., Crowthorne, Berks. (England)

1968 20p
Report no. RRL-LR-170

Results of measurements of skidding resistance obtained with a sideway-force test vehicle are given. Cost information, design, traffic flows and texture-depths of surfacings (Gussasphalt, asphaltic concrete, cement concrete, "Wabit") are included.

Search terms: Skid resistance tests, Surface properties, Pavement surface texture, Germany*, Asphalt pavements*, Con-

crete pavements, Bituminous concrete pavements*

AVAILABILITY: From corporate author

HS-004 810 Fld. 2/4,2/9

LEFT TURN BAY LAYOUT
by Paul C. Box

Published in Public Safety Systems v34 n1 p21-4
(Jan-Feb 1969)

Left turn restrictions may increase intersection capacity or reduce accidents, but they are not always possible. This article reviews typical layout principles for left turn bays--approach and departure tapers, channelizations, special markings--as an alternate solution.

Search terms: Turning left, Traffic control, Left turn bays*, Traffic lanes, Traffic markings, Urban areas

HS-004 811 Fld. 2/4

SURFACE DRESSING ON MOTORWAYS AND HIGH SPEED ROADS
by D. A. Robinson

Published in Roads and Road Construction v46 n551 p335-8
(Nov 1968)

Discusses preferred conditions, methods, and equipment used in embedding chippings in road surfaces successfully. Also covers removal of excess chippings, spraying equipment, and controlling flow of traffic while surface is being dressed.

Search terms: Pavement skidding characteristics, Surface treatments*, Chips*, Great Britain*, Road surfaces, Skid resistance, Traffic control, Sprayers

HS-004 866 Fld. 2/4,5/20

DESIGN OF BRIDGE FACILITIES TO PROVIDE SAFETY IN MAINTENANCE, OPERATIONS AND

2/4 Design & Construction (Cont.)

HS-004-866 (Cont.)

PUBLIC USAGE

by Daniel M. Hahn
Port of New York Authority,
N. Y.

5-7 May 1968 p49-56

Presented at International
Bridge, Tunnel and Turnpike
Association, Inc., Spring
Conference - Maintenance
Committee, Cherry Hill, N. J.

Examines the requirements of
a bridge barrier system,
where guardrails must be
stronger than on highways.
Reports on impact tests. It
is not known if present
bridge rails will keep
36-ton vehicles from going
over the edge. Median
barrier design is also
discussed. Outlines the
practices of the Port of
New York Authority in
managing traffic of trucks
that are heavy, overloaded,
or carrying hazardous
materials.

Search terms: Bridge
design, Safety design,
Maintenance, Guardrail
design, Barrier design,
Impact tests, Median
barriers, Hazardous
materials*, Trucks,
Weight limits, Port
of New York Authority*,
Safety inspection

AVAILABILITY: From
corporate author

HS-004 867 Fld. 2/4

TANGENTIAL OFF-RAMPS ON
FREEWAYS. FINAL REPORT
by Harry W. Case,
Slade Hulbert
California Univ., Los Angeles.
Inst. of Transportation and
Traffic Engineering

Dec 1965 10p

Discusses a freeway ramp
design in which the freeway
curves to the driver's left
and the ramp continues straight.
Some difficulty has been encoun-
tered with this design when
drivers, especially in the far

right lane, fail to recognize
the pavement before them as a
ramp and continue in a straight
line. There is risk of acci-
dents when drivers try to
correct their errors at high
speed. Motion pictures of
such ramps were used for
simulated driving tests, and
it is recommended that exit
signs be installed at these
locations.

Search terms: Ramps, Freeways,
Los Angeles County*, Signs
(displays), Highway design,
Accident risks, Driver
behavior, Driving simulation,
High speed, Ramp response*

AVAILABILITY: From
corporate author

HS-004 868 Fld. 2/4

A SMASHING SUCCESS
Anonymous

Published in Texas Highways
v16 n2 p8-9 (Feb 1969)

Crash cushions (barrels or
drums located at freeway
parapets, highway exit ramps)
absorb impact energy, saving
lives, and reducing property
damage.

Search terms: Vehicle
impact attenuators*,
Attenuators, Energy absorp-
tion, Accident prevention,
Accident protection,
Highway safety

HS-004 932 Fld. 2/4

PROTECTIVE COATINGS TO PRE-
VENT DETERIORATION OF CONCRETE
BY DEICING CHEMICALS
by M. Jack Snyder
Battelle Memorial Inst.,
Columbus, Ohio and Highway
Research Board, Washington,
D. C.

1965 31p 24 refs
Report no. NCHRP-16; NAS-NRC-
Pub-1215

Deterioration of concrete
bridge decks and structures
from scaling caused by deicing
chemicals has become an
increasingly serious problem.
A total of 110 coatings was
evaluated. Good protection

of non-air-entrained concrete
was obtained only with a few.
Considering both economy and
performance, the best results
were obtained with vegetable
oils, particularly linseed
oil. The mixture of linseed
oil and mineral spirits now
used by state highway depart-
ments is recommended.

Search terms: Bridge surfaces,
Ice removal, Concretes,
Coatings, Sodium chloride*,
Corrosion prevention

AVAILABILITY: From HRB

HS-004 933 Fld. 2/4

ROADSIDE HAZARDS
by John A. Blatnik,
Charles W. Prisk,
Salvatore J. D'Amico

1968 68p

Published by Eno Foundation
for Highway Traffic Control,
Inc., Saugatuck, Conn.
Includes: THE NEED FOR HIGH-
WAY SAFETY CONSCIOUSNESS,

by Rep. John A. Blatnik and
AN EVALUATION OF ROADSIDE
HAZARDS ON THE INTERSTATE
SYSTEM, by Charles W. Prisk.
Based on report of May-July
1967 hearings before Special
Subcommittee on the Federal-
Aid Highway Program, House
Public Works Comm. (cf.
HS-001 528).

Blatnik article outlines the
highway safety problem,
especially the dangers in
roadside design and construc-
tion, the analysis of roadside
hazards and how they can be
corrected, and the need for
highway departments to design
safer roads. Prisk article
discusses guardrails, signs
and supports, curbs, drainage
elements, bridges, bridge
approaches, bridge railings,
shoulders and slopes, and
lighting from the hazard
point of view. A section
of photos of typical hazards
is included.

Search terms: Highway safety,
Hazards, Highway design,
Highway signs, Curbs*,
Highway drainage, Bridges
(structures), Road shoulders,
Highway lighting, Interstate

2/4 Design & Construction (Cont.)

HS-004-933 (Cont.)

highway system, Highway construction, Highway engineering, Safety design, Guardrails

AVAILABILITY: From corporate author

HS-004 978 Fld. 4/8, 5/4, 2/4

TOMORROW'S TRANSPORTATION: NEW SYSTEMS FOR THE URBAN FUTURE

Urban Transportation Administration, Washington, D. C. Office of Metropolitan Development

May 1968 114p 39 refs
Report no. M/MP-62

Offers a transportation research and development program which could require \$980 million in total funding. Systems with potential are: Dial-a-Bus; Personal Rapid Transit; Dual Mode Vehicle Systems; Automated Dual Mode Bus; Ballet or Ferry Systems using high speed guideways.

Search terms: Transportation Planning, Automatically guided automobiles, Mass transportation, Rapid Transit Railways, Electronic Traffic Control, Urban planning, Sociological aspects, Federal aid, Motor vehicle design

AVAILABILITY: From GPO \$1.75

HS-005 017 Fld. 2/4

DESIGN VEHICLE CRITERIA AND GEOMETRIC DESIGN
by Arthur Henderson, Michael Cole

Published in *Traffic Engineering and Control* v9 n9 p431-5 (Jan 1968)

Efficient design of road space and maneuvering space gives highest capacity for vehicle movement. Scaled illustrations compare dis-

tances required by standard cars, commercial, rigid, and articulated vehicles when cornering and making U-turns.

Search terms: Highway design, Cornering, U-turns*, Articulated vehicles*, Motor vehicle design, Commercial vehicles, Automobiles, Turning (direction change), Vehicle size, Road curves, Traffic capacity

HS-005 057 Fld. 2/4, 5/4, 4/8

THE CENTURY EXPRESSWAY CONCEPT

by Robert A. Wolf

Cornell Aeronautical Lab., Inc., Buffalo, N.Y.

20 Oct 1965 7p

Presented at Workshop Session, Institute of Traffic Engineers, 35th Annual Meeting, Boston, Mass.

Expressways capable of accommodating 100 mph cruising speeds are technically feasible for 1980. Special type autos, "Century Cruisers", specially licensed drivers, accident reducing and injury alleviating features for both vehicle and highway must be incorporated in planning.

Search terms: Automobile design, Controlled access highways, Highway design, High speed, Driver licensing, Safety design, Experimental vehicles*

AVAILABILITY: Corporate author

HS-005 058 Fld. 2/4

DEVELOPMENTS IN THE MEASUREMENT OF STRAIN AND STRESS IN CONCRETE BRIDGE STRUCTURES

by R. G. Tyler

England. Road Research Lab., Crowthorne, Berks.

1968 65p
Report no. RRL-LR-189

Development work on the design of acoustic strain gauges is described, including the introduction of a stainless steel barrel for the Road Research Laboratory buried gauge. New designs are also given for a surface

gauge and a long, buried gauge. Methods for the estimation of stress in concrete structures are reviewed and a new method based on strain simulation is presented.

Search terms: Strain gauges*, Bridges (structures), Concretes, Stresses, Simulation, Acoustic measuring instruments*

AVAILABILITY: Corporate author

HS-005 059 Fld. 2/4

RESPONSE OF SIMPLE-SPAN HIGHWAY BRIDGES TO MOVING VEHICLES

by W. H. Walker, A. S. Veletsos

Illinois Univ., Urbana. Engineering Experiment Station

1966 187p 23 refs
Report no. Bull-486

Bridge-vehicle systems are studied to provide information on the behavior of simple-span highway bridges under passage of heavy vehicles. The effect of roadway roughness and concepts and simple rules for estimating the magnitude of maximum dynamic effects are considered.

Search terms: Bridges (structures), Heavy duty vehicles, Loads (forces), Vehicle weight, Dynamics, Stresses, Mathematical analysis, Axles*, Bridge approaches*, Bridge surfaces, Vibration, Bridge design

AVAILABILITY: Corporate author \$4

HS-005 065 Fld. 2/9, 2/4

ROAD MARKINGS AS AN AID TO TRAFFIC MOVEMENT

by F. M. Hale

Published in *Traffic Engineering & Control* v9 n1 p57-8, 60 (May 1967)

The main classes of road marking used to control traffic movement in Great Britain are: longitudinal, transverse, worded and box, and junction markings. Possible future requirements resulting from changing traffic conditions are considered.

Search terms: Traffic markings, Great Britain*, Traffic flow, Traffic control

2/4 Design & Construction (Cont.)

HS-005 102 Fld. 2/4; 5/4, 4/8

DESIGNING THE 100 MPH EXPRESSWAY

Anonymous

Published in *Highway Research News* n34 p48-52 (Winter 1969)

Reprinted from *Research Trends* (Summer 1968).

Highway transportation systems geared to sustained speeds of 100 mph are possible. This article describes one such system, the Century Expressway. A computerized surveillance-and-control system will permit specially licensed motorists to enter. Design specifications for the special car, the Century Cruiser, are also included.

Search terms: Experimental vehicles, Controlled access highways, Century Cruisers*, Century Expressways*, Highway design, Automobile design, High speed, Safety design, Driver licensing factors, Statistical analysis, Hazards, Costs

HS-005 116 Fld. 2/9, 2/4

DESIGN OF SIGNAL-CONTROLLED TRAFFIC JUNCTIONS ALLOWING FOR RIGHT TURN MOVEMENT

by H-K Lam

Published in *Journal of the Institution of Highway Engineers* v14 n8 p23-7 (Aug 1967)

Describes a method of traffic control in which the usual channelizing island in the middle of the junction, while retaining its original function, is converted into an area for temporary storage of right-turn traffic. Traffic moves into this storage island in the first phase and is released on the second. Traffic cuts and merging of different traffic streams are thereby eliminated. Several design examples are discussed. Study deals with British traffic conditions

Search terms: Traffic control, Turning right, Merging Traffic, Intersections, Highway design, Turning lanes*, Great Britain*

HS-005 121 Fld. 3/4, 2/4, 5/4

THE PSYCHOLOGICAL ASPECTS OF HIGHWAY SAFETY

by Calvin H. Brainard

Published in *Trial* v4 n5 p55-7, 60-3 (Aug-Sep 1968)

Presented at the New England Highway Traffic Safety Conference, Apr 1968.

Suggests that auto manufacturers and insurers have always attributed accidents to the driver, and that the new safety establishment sponsored by the federal government attributes accidents to technological and environmental conditions, particularly unsafe cars and highways. The potential effects of this shift in emphasis are examined, and a proper balance between the two kinds of causes is recommended. Driver behavior as an accident cause is examined.

Search terms: Injuries, Fatalities, Accident causes, Driver behavior, Highway design, Automobile design, Psychological factors, Insurance industry*, Automotive industry, Highway safety, Environmental

HS-005 135 Fld. 5/22, 2/4, 2/7

SKIDDING ACCIDENTS ON RUNWAYS AND HIGHWAYS CAN BE REDUCED

by Walter B. Horne

Published in *Astronautics and Aeronautics* v5 n8 p48-55 (Aug 1967) 7 refs

Points out several tire, pavement, and vehicle-operating conditions that degrade both aircraft and ground vehicle safety: smooth and worn tires, smooth textured pavement. An educational program which highlights operational hazards and vehicle limitations for substantial reduction of skidding accidents and antiskid devices is recommended.

Search terms: Skidding, Runways, Aircraft, Surface properties, Wet skidding, Tire treads, Pavements, Grooving*, Pavement skidding characteristics

HS-005 147 Fld. 2/4

SAFETY CONSIDERATIONS IN MEDIAN DESIGN

by John W. Hutchinson; Thomas W. Kennedy

Published in *Highway Research Record* n162 p1-29 (1967) 8 refs

Presented at the 45th Annual Meeting of HRB.

Frequency, nature, and causes of vehicle encroachments on medians of divided highways were investigated to establish safety criteria for median width and cross section design, and for safe stopping or control of vehicles in the median. Effects of median design, traffic volume, road design, weather, signs, and other features of the driving environment were analyzed.

Search terms: Median encroachments*; Medians (dividers); Accident location; Highway design; Accident causes; Collisions (accidents); Traffic volume; Driving conditions; Highway signs; Weather; Divided highways*; Safety design; Stopping distance; Motor vehicle control

HS-005 148 Fld. 2/4

RUBBER RAILROAD CROSSINGS

Anonymous

Published in *American Road Builder* v46 n2 p8-9 (Feb 1969)

Heavy lag bolts hold rubber pads in place on ties under the rail. Pads roll with the punch permitting severe wear and tear from highway vehicles and trains, yet rebound to original position after load is removed. Maintenance is negligible, more than offsetting the higher original cost.

Search terms: Railroad grade crossings*; Highway maintenance; Rubber*; Grade crossings (highways)*

HS-005 206 Fld. 2/4

SLIPFORM PAVEMENT SHOWS EXCELLENT PERFORMANCE ON IOWA COUNTY ROADS

by Elmer G. Clayton

Published in *Better Roads* v39 n4 p24-7 (Apr 1969)

Traces development of slipform paving in Iowa. The technique is useful especially on secondary roads and provides good quality at lower

2/4 Design & Construction (Cont.)

HS-005-206 (Cont.)

cost. Equipment and materials used are outlined.

Search terms: Rural areas; Highway construction; Iowa*; Slip form paving*; Paving equipment*; Costs*; Secondary highways

HS-005 207 Fld. 2/4

A HIGHWAY ENGINEER'S VIEW OF BRIDGING RAILWAYS

by A. B. George

Published in *Journal of the Institution of Highway Engineers* v14 n11 p3-10 (Nov 1967) 9 refs

Discusses the design and building of bridges over railways and the responsibility for maintaining the safety of passengers, staff, and trains during construction. Some ideas of costs (for Britain) are given.

Search terms: Railroads; Bridges (structures); Great Britain*; Highway design; Costs*; Highway bridges*; Construction sites*; Safety measures

HS-005 208 Fld. 2/4

NEW YORK TESTS GROOVE PATTERNS

Anonymous

Published in *Better Roads* v39 n4 p22-3 (Apr 1969)

The effectiveness of road grooving and texturing to improve skid resistance of portland-cement-concrete pavements will be evaluated by the New York State Dept. of Transportation. Five different groove patterns were cut into a heavily traveled road. Two patterns were cut longitudinally and three were cut transversely, an innovation on highways.

Search terms: Skid resistance tests; Concrete pavements; Grooving*; New York*; Pavement skidding characteristics; Wet skidding; Performance tests

HS-005 209 Fld. 2/4

SELECTED SURFACING MATERIALS CAN MAKE HIGHWAYS SAFER

by Harry J. Thompson

Published in *Public Works* v98 n12 p96-7 (Dec 1967)

Restrictions faced by materials engineer to produce high quality, skid resistant roads and still keep maintenance costs low. More freedom is desired to develop new products, as ceramic slag, and test new methods of resurfacing highways. Too much emphasis is placed on maintenance rather than safety.

Search terms: Highway construction; Highway surfaces; Highway maintenance; Highway safety; Highway costs; Skid resistance; Slags*; Materials tests; Ceramic coatings*

HS-005 265 Fld. 2/4

A ROAD BY ANY OTHER NAME WOULD BE JUST AS CONFUSING

by Edward M. Hall

Published in *Nation's Cities* v6 n7 p24-5 (Jul 1968)

Uniform national street and highway functional classification nomenclature and procedure should be developed to identify urban street and highway systems and as a basis for a formula for allocating Federal-aid funds.

Search terms: Classifications; Streets; Urban highways; Rural highways; Federal aid; Highway administration; Highway planning

HS-005 266 Fld. 2/4

EASEMENT FOR CIRCULAR CURVES

by Wayne H. Valentine

Published in *Rural and Urban Roads* v7 n3 p52-3 (Mar 1969)

Easement curves for transition from straight to circular highway alignment are desirable, both from the safety and aesthetic points of view. A formula is given for calculating a spiral curve layout.

Search terms: Highway design; Highway safety; Road curves; Landscape design

HS-005 267 Fld. 2/4

CHARLESTON T INTERCHANGE...SPRAWLING BUT SEGMENTED CONSTRUCTION PROJECT

by John P. Ward, Jr.

Published in *Dixie Contractor* p22-3 (19 Apr 1968)

Describes the construction and site management of an interchange in the heart of Charleston. Tasks were broken down into multiple jobs because of congestion.

Search terms: Interchanges; South Carolina*; Traffic congestion; Highway construction

HS-005 299 Fld. 5/4; 2/4; 2/9

AUTOMATED ROAD VEHICLES...

by Bill Firth

Published in *Automotive Design Engineering* v7 p58-9 (Nov 1968)

Outlines the Traffic Intensifying Systems (TIS) concept and sets forth seven requirements for it: that the vehicle should need no input from the road or other vehicles, should not obstruct other vehicles, that vehicle failures should affect no other vehicles, that driver should have control, that component failures should not have consequences worse than present ones, that system should allow route selection and unscheduled stops, and that system should insure use of all existing roads and permit new vehicle designs.

Search terms: Automatic high-

2/4 Design & Construction (Cont.)

HS-005-299 (Cont.)

ways; Automobile design; Automatically guided automobiles; Automatic control; Traffic flow

HS-005 324 Fld. 2/4; 1/4

STATES ATTACK HIGHWAY ACCIDENTS

Anonymous

Published in *Engineering News-Record* p9-11 (28 Jul 1966)

Describes spot improvement programs to correct high hazard locations. Accident rates have been reduced by improvements at intersections and other hazardous sites.

Search terms: Accident rates; Accident location; Accident prevention; Hazards; Highway engineering; Highway maintenance; Intersections; Safety engineering

HS-005 325 Fld. 2/4

SOME ASPECTS OF INTERCHANGE DESIGN

by H. Hong

Published in *Traffic Engineering* v36 n10 p26-30 (Jul 1966)

Geometric designs of interchanges in Milwaukee have been studied. It is concluded that designs still need improvement; that interchanges must be an integral part of the freeway system; that visibility should be taken into account in designing horizontal and vertical alignments; that egress and ingress points should have no unexpected features; that visibility requirements must be described geometrically as well as by sight distance; that weaving sections urgently need improvement; that bottlenecks reduce efficiency of the system.

Search terms: Interchanges; Wisconsin*; Highway design; Ramps; Visibility; Traffic congestion; Weaving traffic; Freeway planning

HS-005 326 Fld. 2/4

URBAN INTERCHANGE DESIGN AS RELATED TO TRAFFIC OPERATION. PART II: CLOVERLEAF AND DIRECTIONAL INTERCHANGES

by Charles Pinnell; Johann H. Buhr

Published in *Traffic Engineering* v36 n7 p51-7 (Apr 1966) 11 refs

Part 1 is HS-005 339.

Describes major types of interchanges: full and partial cloverleaves, exits, left-hand ramps, two-lane ramps. Discusses the influence of design factors on traffic operation.

Search terms: Highway design; Freeways; Cloverleaf ramps; Interchanges; Ramps; Exits

HS-005 327 Fld. 2/4

EFFECT OF ROAD SURFACE IRREGULARITIES AND STRUCTURAL VARIABILITY ON DYNAMIC PRESSURES UNDER FLEXIBLE ROADS

by S. A. H. Morris; J. W. Galloway

England. Road Research Lab., Crowthorne, Berks.

1968 36p 16 refs

Report no. RRL-LR-215; PB-182 981

Vertical components of dynamic stress generated in the soil subgrade by vehicles travelling along road surfaces were measured. In addition to the main factors—vehicle speed, wheel load, road temperature—uncontrolled factors can cause soil stress to vary up to plus or minus 35% under the same nominal construction.

Search terms: Highway design; Structural analysis; Stresses; Road surfaces; Loads (forces); Pavement surface texture; Soil mechanics*

AVAILABILITY: CFSTI as PB-182 981

HS-005 328 Fld. 2/4; 4/7

A DIGITAL COMPUTER PROGRAM TO SIMULATE THE PASSAGE OF A VEHICLE OVER A ROAD SURFACE

by W. R., Bellini; E. N. Thrower

England. Road Research Lab., Crowthorne, Berks.

1968 24p

Report no. RRL-LR-181; PB-182 097

Research on the dynamic behavior of roads under moving vehicles includes an investigation of the additional loading applied to the road by the passage of heavy commercial vehicles

over surface irregularities. This note describes computer programs, written for an I. C. T. "Atlas" computer, for the study of dynamic loading.

Search terms: Computerized simulation; Vehicle simulation; Computer programs; Digital computers; Road surfaces; Pavement surface texture; Dynamic loads; Commercial vehicles

AVAILABILITY: CFSTI as PB-182 097

HS-005 329 Fld. 2/4

RUBBERIZED STREET RIDES "SMOOTHER"

by Russell L. Langseth

Published in *Public Works* v100 n3 p102-4 (Mar 1969)

Advantages of rubberized asphalt for a Minnesota street (toughness, smooth riding surface, longer life, tenacity, recovery, impact and skid resistance) and construction details are given. Some problems involved driveways, matting. Skid resistance tests revealed no significant difference between rubberized and non-rubberized bituminous surfaces.

Search terms: Urban areas; Elastomer modified asphalts*; Asphalt pavements*; Highway construction; Skid resistance tests; Road surfaces; Minnesota*; Pavement surface texture

HS-005 330 Fld. 2/4

SKID RESISTANCE CHARACTERISTICS OF THERMOPLASTIC STRIPES

by G. Kemp

California. Div. of Highways, Sacramento. Materials and Research Dept. 2 Jun 1965 12p

Tests were performed with a standard passenger car at speeds up to 80 mph to determine control problems when weaving over wet or dry thermoplastic or painted stripes. No greater hazard in vehicle operation over thermoplastic stripes than paint stripes was observed. There was some loss of control when braking occurred with 2 wheels directly over 8 inch stripes.

Search terms: Skid resistance tests; Thermoplastics*; Traffic lanes;

2/4 Design & Construction (Cont.)

HS-005 330 (Cont.)

Traffic markings; Wet skidding; Paints; Braking; Weaving traffic; Motor vehicle handling; Speed

AVAILABILITY: Corporate author

HS-005 331 Fld. 2/4

DESIGN CRITERIA FOR PEDESTRIAN BRIDGES

by David Davies

Published in *Traffic Engineering and Control* v9 n5 p259 (Sep 1967)

Characteristics of a well designed bridge include simplicity in appearance, lightness & economy of materials, minimum number of supports, access systems. Seven pedestrian bridge designs approved by the Council of Industrial Design (Great Britain) are listed.

Search terms: Great Britain*; Overpasses*; Pedestrian safety; Bridge design

HS-005 339 Fld. 2/9; 2/4

URBAN INTERCHANGE DESIGN AS RELATED TO TRAFFIC OPERATION. PART I—DIAMOND INTERCHANGES

by Charles Pinnell; Johann H. Buhr

Published in *Traffic Engineering* v36 n6 p20-30 (Mar 1966)

Part 2 is HS-005 326.

Discusses aspects of the diamond interchange: signal phasing, capacity, spacing of at-grade intersections, median design, turn lanes, and ramp configuration. These aspects are discussed for conventional diamond interchanges, split diamond interchanges, and three-level diamond interchanges.

Search terms: Interchanges; Intersections; Traffic signals; Traffic capacity; Medians (dividers); Traffic lanes; Ramps; Signalized intersections*; Turning lanes*

HS-005 386 Fld. 2/0; 2/4; 4/3

STANDARDS FOR HIGHWAY SAFETY IMPROVEMENTS

Published in *American Road Builder* v44 n6 p11-3 (Jun 1967)

Criteria for highway improvements are discussed. Hazardous locations need to be identified, forecasts made of the results of remedial action, cost-effectiveness analysis of improvements made, and the benefits and costs of spot improvements and overall highway modernization contrasted. Means for making these evaluations are discussed, especially a good accident records system.

Search terms: Accident location; Accident records; Benefit cost analysis*; Costs*; Highway maintenance; Forecasting; Spot improvement program*

HS-005 390 Fld. 2/4

A STUDY OF THE EFFECT OF USING COLORED GUIDE POSTS ON INTERSTATE HIGHWAYS TO REDUCE ACCIDENTAL DAMAGE

by J. H. David; Larry Lett

Alabama. Highway Dept., Montgomery

Aug 1968 25p

Determines effect painting delineator posts orange will have on reducing damage by vehicles and maintenance machinery. Results showed unpainted posts suffered more damage than painted posts.

Search terms: Accident prevention; Costs*; Poles (supports); Paints; Color; Highway maintenance; Damage; Interstate highway system

AVAILABILITY: Corporate author

HS-005 391 Fld. 2/4

INSTRUCTIONS FOR USING RRL POST SETTING RIGS WHEN ERECTING TENSIONED-BEAM CRASH BARRIERS

by L. C. Pearson

England. Road Research Lab., Crowthorne, Berks.

1968 20p
Report no. RRL-LR-178

The tensioned-beam crash barrier

system developed by Road Research Laboratory requires over 500 replaceable steel posts per mile, each of which is set in concrete. A rig mounted on castor wheels has been designed to hold the post rigidly in position while the concrete is tamped down.

Search terms: Highway construction; Barrier design; Poles (supports); Concretes; Roadside equipment; Construction equipment

AVAILABILITY: CFSTI

HS-005 392 Fld. 2/4

CONSTRUCTION AND INSTRUMENTATION OF AN EXPERIMENTAL CONCRETE ROAD ON TRUNK ROAD A. 1, TUXFORD BY-PASS, TO DETERMINE THE EFFECT OF OMITTING EXPANSION JOINTS

by E. E. Lock

England. Road Research Lab., Crowthorne, Berks.

1968 26p 3 refs
Report no. RRL-LR-218

The growing tendency to omit expansion joints in concrete road construction presents some risk of pavement blow-up and damage to bridges. This report describes the construction and instrumentation of a full-scale trial in which stresses in slabs without expansion joints are being measured.

Search terms: Highway construction; Bridges (structures); Stresses; Structural analysis; Measuring instruments; Concrete pavements; Expansion joints*

AVAILABILITY: CFSTI

HS-005 393 Fld. 2/4

A STUDY OF UNIT WEIGHT, VOLUME AND CEMENT FACTOR OF FRESH CONCRETE

by Donald L. Spellman

California. Div. of Highways, Sacramento. Materials and Research Dept.

Jun 1967 22p
Report no. M&R-635148-1

Test results are presented which show the effects of various compactive efforts on unit weight, yield, and cement factor of fresh concrete.

2/4 Design & Construction (Cont.)

HS-005-393 (Cont.)

Purpose of the tests is to determine the amount of cement in concrete used for paving.

Search terms: Concretes; Laboratory tests; Field tests; Compaction*; Cements*

AVAILABILITY: Corporate author

HS-005 410 Fld. 4/8; 5/4; 2/4

IDEAS PILE UP FOR DRIVERLESS CARS, AUTOMATED ROADWAYS

Anonymous

Published in *Machine Design* v40 n9 p20-24, 26-27, 29

Ideas for electronically controlled, fully automatic car-roadway systems are outlined. Highway capacity, driver comfort, and safety would be increased. Automatic highways may use individually powered vehicles, individually-powered two-mode systems using guideways, or pallet-type systems.

Search terms: Transportation systems; Urban areas, Transportation planning; Automatic highways; Automatically guided automobiles; Automobile design; Experimental vehicles; Highway safety; Automatic control; Traffic capacity; Comfort; Guideways*; Palletizing*; Electric automobiles

HS-005 427 Fld. 2/4

TREATMENTS TO RETEXTURE A WORN CONCRETE SURFACE OF A HIGH-SPEED ROAD

by D. E. Weller; D. P. Maynard

England. Road Research Lab., Crowthorne, Berks.

1969 32p 7 refs

Report no. RRL-LR-250; PB-184 174

Experiments were carried out to determine the most suitable treatment to restore adequate skidding resistance to a worn concrete surface of a high-speed road. The best overall results were given by a diamond pattern of narrow grooves and by

wide transverse grooves.

Search terms: Concrete pavements; Skid resistance; Grooving*; Highway surfaces; Great Britain*; High speed; Pavement surface texture

AVAILABILITY: CFSTI as PB-184 174

HS-005 487 Fld. 2/4; 4/7

OPTIMUM CURVATURE PRINCIPLE IN HIGHWAY ROUTING

by Bernard E. Howard; Zacarias Bramnick; Jocelyn F. B. Shaw

Published in *Journal of the Highway Division Proceedings of the American Society of Civil Engineers* v94 nHW1 p61-82 (Jun 1968) 22 refs

Presented (condensed) at the American Society of Civil Engineers Structural Engineering Conference, Miami Beach, Fla., Jan 31-Feb 4, 1966.

Examines the problem of determining the best possible highway route between two cities. The calculus of variations is used to derive the optimum curvature principle: the curvature of an optimum location highway at each point is equal to the logarithmic directional derivative of the criterion function perpendicular to the route. The meaning of the principle is clarified by graphic descriptions and a numerical example.

HS-005 521 Fld. 2/4

BOOBY TRAPPED HIGHWAYS

Federation of Insurance Counsel, Washington, D.C.

1968 17p

Some common road hazards responsible for the increase of highway deaths and injuries are illustrated from recently built interstate highways. Examples of hazards given are: improperly installed guardrails; sign posts constructed of steel beams instead of breakaway posts; and signs positioned too close to road. These hazards contribute to a high rate of single vehicle fatalities on interstate highways. Engineering solutions are available to solve these problems.

Search terms: Guardrails; Hazards;

Highway signs; Trees*; Breakaway bases*; Fatalities; Single vehicle accidents; Interstate highway system; Highway construction; Highway engineering; Highway design; Accident rates

AVAILABILITY: Corporate author

HS-005 522 Fld. 2/4

PAVEMENT GROOVING AND TRACTION STUDIES

National Aeronautics and Space Administration, Washington, D.C.

1969 521p

Report no. NASA-SP-5073; N69-20451

Papers presented at a conference held at Langley Research Center Hampton, Virginia, November 18-19, 1968

This collection of papers discusses reduction of aircraft and motor vehicle hydroplaning on runways and highways by pavement grooving. Methods, equipment, tests, benefits, disadvantages, etc. are discussed for the United States and Great Britain. Includes a description of three 16 mm films on hydroplaning.

Search terms: Highway safety; Wet skidding; Aviation safety; Accident prevention; Runways; Grooving*; Skid resistance; Pavement skidding characteristics; Conferences*; Road surfaces; Highway surfaces; Skidding accidents; Great Britain*; United States*; Audiovisual aids

AVAILABILITY: CFSTI as N69-20451 (Includes HS-005 523 to HS-005 550)

HS-005 523 Fld. 2/4

HIGHWAY AND RUNWAY TRACTION STUDIES—THE PROBLEM, HISTORY, OBJECTIVES, AND NASA PROGRAM

by Walter B. Horne; E. A. Whitehurst
Langley Research Center, NASA, Hampton, Va.; Tennessee. Highway Research Program, Knoxville

29 refs

Presents milestones achieved in highway and runway traction research. Most of this research describes quantitatively by theory and experiment the major causes of pavement

2/4 Design & Construction (Cont.)

HS-005-523 (Cont.)

slipperiness in terms of pavement, vehicle, tire, operator, and atmospheric or precipitation parameters.

Search terms: Grooving*; Skidding; Wet skidding; Highway research; Highway design; Skid resistance; Traction; Pavement skidding characteristics; Runways; Tire-road conditions; Highway surfaces; Environmental factors; Man machine systems; Highway surfaces

AVAILABILITY: Paper 1 in NASA's *Pavement Grooving and Traction Studies* (N69-20451) p3-18 (HS-005 522)

HS-005 524 Fld. 2/4

RUNWAY AND HIGHWAY TRACTION STUDIES—THE PROBLEM, THE OBJECTIVES, AND THE PROGRAMME IN GREAT BRITAIN. PT. 1. RUNWAY TRACTION STUDIES

by L. J. W. Hall

Air. Registration Board, Redhill, Surrey (England)

Traction research programs in Great Britain are designed to minimize risk of aircraft accidents due to inadequate friction. Topics covered are: correlation trials, aquaplaning, drainage, warning systems for water depth, durability of runway surfaces, effect of tire wear, and future objectives.

Search terms: Wet skidding; Traction; Tire wear; Pavement surfaces; Pavement skidding characteristics; Runways; Accident prevention; Aviation accidents; Highway surfaces; Friction tests; Drainage; Warning systems; Aviation safety

AVAILABILITY: Paper 2, pt. 1 in NASA's *Pavement Grooving and Traction Studies* (N69-20451) p19-24 (HS-005 522)

HS-005 525 Fld. 2/4

RUNWAY AND HIGHWAY TRACTION STUDIES—THE PROBLEM, THE OBJECTIVES, AND THE PROGRAMME IN GREAT BRITAIN. PT. 2. HIGHWAY TRACTION STUDIES

by F. T. W. Lander

England. Road Research Lab., Crowthorne, Berks.

7 refs

Discusses wet road skidding accidents and Great Britain's road improvement program. Skidding is reported in one of every 3 traffic accidents on wet roads. For good traction at low speeds, road surface must have a harsh feel; for high speed travel, the surface should have large and angular projections.

Search terms: Traction; Skidding accidents; Wet skidding; Great Britain*; Pavement skidding characteristics; Highway surfaces; Wet road conditions; High speed; Pavement surface texture; Skid resistance

AVAILABILITY: Paper 2, pt. 2 in NASA's *Pavement Grooving and Traction Studies* (N69-20451) p 25-33 (HS-005 522)

HS-005 526 Fld. 2/4

COMPARATIVE BRAKING PERFORMANCE OF VARIOUS AIRCRAFT ON GROOVED AND UNGROOVED PAVEMENTS AT THE LANDING RESEARCH RUNWAY, NASA WALLOPS STATION

by Thomas J. Yager

Langley Research Center, NASA, Hampton, Va.

9 refs

Test results were obtained for 19 different transversely grooved runway surfaces. Grooving provided greatly increased aircraft braking and steering capability for wet, flooded, and slush covered runway surfaces.

Search terms: Aircraft; Braking; Grooving*; Pavement surfaces; Runways; Test facilities; Wet skidding; Tire traction

AVAILABILITY: Paper 3 in NASA's *Pavement Grooving and Traction Studies* (N69-20451) p35-65 (HS-005 522)

HS-005 527 Fld. 2/4

R.A.E. AIRCRAFT TESTS ON GROOVED, OPEN GRADED AND ASPHALT RUNWAYS IN GREAT BRITAIN

by B. Shilling

England. Royal Aircraft Establishment, Farnborough, Hants.

7 refs

Aircraft tests determined wet braking force coefficients obtainable on runways with widely different surface textures. Results support the view that a harsh, coarse textured surface will give improved braking at aircraft touchdown speeds.

Search terms: Aircraft; Runways; Wet skidding; Pavement surface texture; Tire traction; Wear tests; Braking

AVAILABILITY: Paper 4 in NASA's *Pavement Grooving and Traction Studies* (N69-20451) p67-80 (HS-005 522)

HS-005 528 Fld. 2/4; 5/22

AQUAPLANING. THE BRITISH MINISTRY OF TECHNOLOGY PROGRAMME

by J. R. Williams

College of Aeronautics, Cranfield, Beds. (England)

Reports minimum depth of standing water required to support an aquaplaning tire and evaluates effects of runway texture and tire pressure on critical depth. Height of aquaplaning tire above runway was measured in attempts to obtain a criteria for runway surface texture and to correlate these with aquaplaning characteristics.

Search terms: Runways; Wet skidding; Grooving*; Tire traction; Asphalt pavements*; Pavement surface texture; Tire characteristics; Concrete pavements

AVAILABILITY: Paper 5 in NASA's *Pavement Grooving and Traction Studies* (N69-20451) p81-99 (HS-005 522)

HS-005 529 Fld. 2/4

CALCULATED AIRPLANE STOPPING DISTANCES BASED ON TEST RESULTS OBTAINED AT THE LANDING RESEARCH RUNWAY, NASA WALLOPS STATION

by W. Pelham Phillips

Langley Research Center, NASA, Hampton, Va.

2/4 Design & Construction

HS-005-529 (Cont.)

(Cont.)

performance is attainable for grooved runway surfaces in a wet puddled condition.

Search terms: Runways; Grooving*; Weather; Wet skidding; Stopping distance; Aircraft;

AVAILABILITY: Paper 6 in NASA's *Pavement Grooving and Traction Studies* (N69-20451) p101-13 (HS-005 522)

HS-005 530 Fld. 2/4

RESEARCH PILOTS' OBSERVATIONS OF AIRCRAFT PERFORMANCE ON A GROOVED RUNWAY

by Fred J. Drinkwater, 3d; Clark Price; James M. Patton, Jr.

Ames Research Center, NASA, Moffett Field, Calif.; Langley Research Center, NASA, Hampton, Va.

Prepared in cooperation with Langley Research Center, NASA, Hampton, Va.

Transverse groove surfaces drastically reduced all types of skids on a wet or flooded runway and provided better steering.

Search terms: Aircraft; Grooving*; Runways; Wet skidding; Skid resistance; Pavement skidding characteristics; Stopping distance; Pavement surface texture; Skid resistance

AVAILABILITY: Paper 7 in NASA's *Pavement Grooving and Traction Studies* (N69-20451) p115-22 (HS-005 522)

HS-005 531 Fld. 2/4

PROBLEM AREAS ASSOCIATED WITH THE CONSTRUCTION AND OPERATION OF THE LANDING RESEARCH RUNWAY AT NASA WALLOPS STATION

by Curtis R. Allen; James W. Quillen
Wallops Station, NASA, Wallops Island, Va.

Adverse side effects experienced during construction of a grooved and ungrooved landing facility included: reduced visibility due to concrete dust, surface failure of aggregate

asphalt materials, foreign object damage when large aggregate is used. The most significant problem was maintaining the water and slush level needed for the tests. These problems should be considered in planning the operation, since they can be easily resolved.

Search terms: Construction sites*; Grooving*; Runways; Damage; Slush*; Research facilities; Concrete pavements; Asphalt pavements*; Wet skidding

AVAILABILITY: Paper 8 in NASA's *Pavement Grooving and Traction Studies* (N69-20451) p123-34 (HS-005 522)

HS-005 532 Fld. 2/4

COMMERCIAL AIRLINES AND THE GROOVED RUNWAY CONCEPT

by Edwin W. Abbott

Air Transport Assoc. of American, Washington, D.C.

Hydroplaning is a contributing factor in many "off runway" type accidents. Commercial airlines, after operational experience with grooved runways exposed to heavy use and variable weather, are convinced that runway grooving is an effective aid in overcoming hydroplaning.

Search terms: Wet skidding; Runways; Grooving*; Skidding accidents; Aviation accidents; Accident prevention; Environmental factors; Stopping distance; Aviation safety

AVAILABILITY: Paper 9 in NASA's *Pavement Grooving and Traction Studies* (N69-20451) p135-45 (HS-005 522)

HS-005 533 Fld. 2/4

THE AIRLINE PILOTS LOOK AT RUNWAY GROOVING

by Carl F. Eck

Air Line Pilots Assoc., International, Washington, D.C.

Airline pilots found significant benefits from runway grooving. No reduction in runway length requirements should be considered, however. Periodic cleaning schedules are recommended for removal of carbon, rubber, loose materials, and other

contaminants.

Search terms: Grooving*; Runways; Stopping distance; Wet skidding; Maintenance; Braking distance; Aviation safety

AVAILABILITY: Paper 10 in NASA's *Pavement Grooving and Traction Studies* (N69-20451) p147-51 (HS-005 522)

HS-005 534 Fld. 2/4

GENERAL-AVIATION PILOT REACTIONS TO AND OPINIONS ON GROOVED RUNWAYS

by George E. Cranston

Flight Safety Foundation, Inc., Phoenix, Ariz.

Results of a questionnaire survey show that grooving runways increased safety for high speed general aviation aircraft operations by reducing hydroplaning and increasing braking action during wet runway conditions. Pilots operating light low-speed aircraft did not generally realize these benefits.

Search terms: Runways; Grooving*; Wet skidding; High speed; Braking; Speed; Questionnaires*; Aviation safety

AVAILABILITY: Paper 11 in NASA's *Pavement Grooving and Traction Studies* (N69-20451) p153-64 (HS-005 522)

HS-005 535 Fld. 2/4; 5/22

EFFECT OF GROOVED-RUNWAY OPERATIONS ON AIRCRAFT TIRE WEAR AT BEALE AIR FORCE BASE, CALIFORNIA

by David S. McRae

Beale AFB, Calif.

Following a runway transverse grooving project, aircraft tire wear, was investigated. This paper reports cuts occurring on retread tires, one aircraft tire type showing a sustained decrease in tire life. Cuts have little effect on tire wear or operational parameters.

Search terms: Runways; Grooving*; Retreads; Tire wear; Aircraft tires; Damage

2/4 Design & Construction (Cont.)

HS-005-535 (Cont.)

AVAILABILITY: Paper 12 in NASA's *Pavement Grooving and Traction Studies* (N69-20451) p165-83 (HS-005 522)

HS-005 536 Fld. 2/4; 5/22

SOME EXPERIENCE WITH TIRE WEAR AND DAMAGE ON GROOVED RUNWAYS

by Robert H. Hout

Ogden Air Materiel Area, Hill AFB, Utah

The Air Force is experiencing considerable damage to tires from grooved runways. Both new and retreaded tires reveal chevron cuts, chipping, tire tread stripping. Flight safety is involved; additional research is recommended on effects of grooving.

Search terms: Runways; Grooving*; Retreads; Tire wear; Aircraft tires; Aviation safety; Damage; Tire treads

AVAILABILITY: Paper 13 in NASA's *Pavement Grooving and Traction Studies* (N69-20451) p185-8 (HS-005 522)

HS-005 537 Fld. 2/4; 5/22

NASA STUDIES ON EFFECT OF GROOVED RUNWAY OPERATIONS ON AIRCRAFT VIBRATIONS AND TIRE WEAR

by Thomas J. Yager

Langley Research Center, NASA, Hampton, Va.

Tire tread wear data obtained from tests at Langley for a variety of aircraft tire sizes and types on various transversely grooved surfaces are discussed. Results within test limitations indicate no significant increase of aircraft vibration or tire tread wear.

Search terms: Runways; Tread wear; Vibration; Braking; Grooving*; Aircraft tires; Tire treads

AVAILABILITY: Paper 14 in NASA's *Pavement Grooving and Traction Studies* (N69-20451) p189-201 (HS-005 522)

HS-005 538 Fld. 2/4; 5/22

A SURVEY OF THE EFFECT OF GROOVED RUNWAY OPERATIONS ON THE WEAR OF COMMERCIAL AIRLINE TIRES

by James M. Petersen

Investigation of worn commercial aircraft tires indicates grooved runways have not contributed to any apparent change in tire-wear patterns. Incidence of chevron cutting has increased, but no evidence suggests that grooved runways contribute to other tire damage: interply delamination, chafer failures, bead separation, or groove cracking.

Search terms: Grooving*; Aircraft tires; Runways; Tire wear; Retreads; Damage

AVAILABILITY: Paper 15 in NASA's *Pavement Grooving and Traction Studies* (N69-20451) p203-12 (HS-005 522)

HS-005 539 Fld. 2/4

WATER DEPTH AND SLUSH DRAG INSTRUMENTATION

by W. W. H. Clarke

Inertia Switch Ltd., Camberley, Surrey (England)

Two instrumentation systems developed for measuring runway water depth and drag due to slush residue are described. Test evaluation programs are assessed in terms of the aquaplaning phenomenon.

Search terms: Measuring instruments; Runways; Wet skidding; Slush*; Grooving*; Drag*; Rain

AVAILABILITY: Paper 16 in NASA's *Pavement Grooving and Traction Studies* (N69-20451) p213-34 (HS-005 522)

HS-005 540 Fld. 2/4

PAVEMENT SURFACE TREATMENTS AT AIRPORTS IN GREAT BRITAIN

by F. R. Martin

England. Ministry of Public Building and Works, London

Possible treatments of existing concrete and asphalt runway surfaces to improve their skidding resistance

as well as materials and methods which can be used in new construction are described. Detailed specifications for runway surface treatments are included.

Search terms: Pavement skidding characteristics; Runways; Grooving*; Great Britain*; Wet skidding; Concrete pavements; Asphalt pavements*; Skid resistance

AVAILABILITY: Paper 17 in NASA's *Pavement Grooving and Traction Studies* (N69-20451) p235-78 (HS-005 522)

HS-005 541 Fld. 2/4

PAVEMENT GROOVING AT JOHN F. KENNEDY INTERNATIONAL AIRPORT

by I. J. Dornfeld; James P. Muldoon
Port of New York Authority, N. Y.

After 1 year, the grooving pattern used for Kennedy Airport performed satisfactorily in reducing aircraft stopping distance during wet or flooded conditions. No pavement deterioration or maintenance problems have been observed. Disposal of concrete dust during the grooving process was a major problem.

Search terms: Airports; Runways; Grooving*; Wet skidding; Aircraft; Stopping distance; Concrete pavements; Maintenance

AVAILABILITY: Paper 18 in NSAS's *Pavement Grooving and Traction Studies* (N69-20451) p279-88 (HS-005 522)

HS-005 542 Fld. 2/4

REPORT ON GROOVED RUNWAY EXPERIENCE AT WASHINGTON NATIONAL AIRPORT

by R. C. McGuire

Federal Aviation Agency, Washington, D.C.

Grooving minimizes hydroplaning, alleviates the effects of contaminants and smoothly worn surfaces on traction, and improves directional control. It has been found that seal coats will fill up the grooves, that wider

2/4 Design & Construction (Cont.)

HS-005-542 (Cont.)
grooves accumulate debris, that grooved portland cement has more endurance to environmental effects than grooved asphalt, and that surface structure and aggregate size should be considered.

Search terms: Grooving*; Airports; Runways; Damage; Aggregates; Asphalt pavements*; Wet skidding; Tire traction; Coating; Environmental factors; Portland cements*; Debris*

AVAILABILITY: Paper 19 in NASA's *Pavement Grooving and Traction Studies* (N69-20451) p289-300 (HS-005 522)

HS-005 543 Fld. 2/4

RUNWAY GROOVING AT KANSAS CITY MUNICIPAL AIRPORT

by Howard W. Willoughby

Kansas City Municipal Airport, Mo.

Major problem during grooving was concrete dust. If runway traction during inclement weather is improved, this will more than compensate for slightly accelerated deterioration of the runway surface.

Search terms: Runways; Grooving*; Wet skidding; Concrete pavements; Traction

AVAILABILITY: Paper 20 in NASA's *Pavement Grooving and Traction Studies* (N69-20451) p301-8 (HS-005 522)

HS-005 544 Fld. 2/4

RUNWAY GROOVING PROJECT AT CHICAGO MIDWAY AIRPORT

by Michael J. Berry

Chicago Midway Airport, Ill.

Accumulations of debris and slush from the grooving process were immediately washed away from runways by high pressure hoses attached to sprinkling trucks. Grooving undoubtedly reduces the possibility of hydroplaning and other

hazardous conditions for landing aircraft.

Search terms: Grooving*; Runways; Slush*; Aviation safety; Debris*; Wet skidding

AVAILABILITY: Paper 21 in NASA's *Pavement Grooving and Traction Studies* (N69-20451) p309-11 (HS-005 522)

HS-005 545 Fld. 2/4

CIVIL ENGINEERING ASPECTS OF GROOVING

by A. R. Miller

Beale AFB, Calif.

Civil engineering aspects of runway grooving have equal application to the grooving of highway pavements: planning, specifications, inspection, maintenance. Design of a grooving project should consider groove configuration, location of grooving, pavement condition, construction joints, costs. Specifications are included for grooving type and depth on 7 freeways.

Search terms: Runways; Grooving*; Freeways; Costs*; Civil engineering

AVAILABILITY: Paper 22 in NASA's *Pavement Grooving and Traction Studies* (N69-20451) p313-23 (HS-005 522)

HS-005 546 Fld. 2/4

JOINT NASA-BRITISH MINISTRY OF TECHNOLOGY SKID CORRELATION STUDY. RESULTS FROM AMERICAN VEHICLES

by Walter B. Horne; John A. Tanner

Langley Research Center, NASA, Hampton, Va.

7 refs

This program studied 'degree of correlation existing among braking friction data obtained by 21 different highway vehicles, trailers, and 2 aircraft. A promising new concept for estimating aircraft stopping distances on slippery runway surfaces, based on ground vehicle stopping distance measurements, is described.

Search terms: Skidding; Braking; Friction tests; Skid resistance tests; Aircraft; Runways; Trailers; Stopping distance; Pavement skidding characteristics; Wet skidding; Tire Traction; Wet road conditions

AVAILABILITY: Paper 23 in NASA's *Pavement Grooving and Traction Studies* (N69-20451) p325-59 (HS-005 522)

HS-005 547 Fld. 2/4; 5/22

JOINT NASA-BRITISH MINISTRY OF TECHNOLOGY SKID CORRELATION STUDY. RESULTS FROM BRITISH VEHICLES

by R. W. Sugg

England. Ministry of Technology, London

Test with trailers were made on wet grooved runways to determine speed friction and attempt to predict aircraft stopping distance. Correlation of results between vehicles and aircraft is demonstrated. Braking-force coefficients in the anti-skid, locked-wheel, and impending-skid friction conditions are compared, and the effect of changes in tire pressure is discussed.

Search terms: Grooving*; Friction tests; Skidding; Wet skidding; Test equipment; Concrete pavements; Runways; Asphalt pavements*; Tire traction; Inflation pressure; Speed; Trailers; Stopping distance; Anti-skidding devices; Wheel locking

AVAILABILITY: Paper 24 in NASA's *Pavement Grooving and Traction Studies* (N69-20451) p361-409 (HS-005 522)

HS-005 548 Fld. 2/4; 1/4

PAVEMENT GROOVING ON HIGHWAYS

by Eugene E. Farnsworth

California. Div. of Highways, Sacramento

1969 14p 2 refs

Accident rates on concrete highways (especially curves) during rainy weather were unusually high. Pavement grooving was applied to the sur-

2/4 Design & Construction (Cont.)

HS-005-548 (Cont.)

face of the roadway in an attempt to reduce the number of accidents. Before and after accident studies have shown the benefit of pavement grooving.

Search terms: Skidding accidents; Grooving*; Accident rates; Accident prevention; Wet skidding; California*; Accident location; Road curves; Concrete pavements

AVAILABILITY: Paper 25 in NASA's *Pavement Grooving and Traction Studies* (N69-20451) p411-24 (HS-005 522)

HS-005 549 Fld. 2/4; 5/22

RESULTS FROM STUDIES OF HIGHWAY GROOVING AND TEXTURING AT NASA WALLOPS STATION

by Walter B. Horne

Langley Research Center, NASA, Hampton, Va.

5 refs

Skid resistance tests were conducted on 30 pavement surfaces. Transient peak, steady-state peak, and locked-wheel braking coefficients of friction suggest the present locked wheel friction measurements may not represent pavement skid resistance under vehicle rolling or maneuvering conditions. Skid resistance of smooth pavements is dangerously low when vehicles with worn tires are operating at high speed in wet conditions. Open-textured and grooved pavements have adequate skid resistance.

Search terms: Motor vehicle handling; Wet skidding; Skid resistance tests; Pavement skidding characteristics; Tire conditions; Grooving*; Friction tests; Pavement surface texture; Braking; High speed; Wet road conditions; Wheel locking; Tire wear; Highway surfaces

AVAILABILITY: Paper 26 in NASA's *Pavement Grooving and Traction Studies* (N69-20451) p425-64 (HS-005 522)

HS-005 550 Fld. 2/4; 1/3

RESULTS FROM STUDIES OF

HIGHWAY GROOVING AND TEXTURING BY SEVERAL STATE HIGHWAY DEPARTMENTS

by Larry G. Mosher

Clipper Mfg. Co., Kansas City, Mo.

7 refs

Pavement grooving effectively prevents wet-weather accidents. Transverse grooves are usually most beneficial for reducing stopping distances at intersections, crosswalks, toll booths. Curves, bridges, ramps and open roads benefit from longitudinal grooving. Summaries of state projects are included.

Search terms: Wet road conditions; State government; Grooving*; Accident prevention; Wet skidding; Skidding accidents; Bridges (structures); Stopping distance; Accident location; Road curves; Intersections; Ramps; Crosswalks; Highway surfaces

AVAILABILITY: Paper 27 in NASA's *Pavement Grooving and Traction Studies* (N69-20451) p465-504 (HS-005 522)

HS-005 568 Fld. 2/4

FREEWAY ENVIRONMENT AND AESTHETICS

by John L. Loder

Published in *Traffic Engineering* v36 n5 p25-8 (Feb 1966)

Urges that highway engineers take more account of visual aesthetics. Discusses the choice of location for freeways, the desirability of open space, right of way and median design, tree planting.

Search terms: Landscape design*; Highway planning; Freeway planning; Roadside planting*; Highway engineering; Medians (dividers); Right-of-way (land)*

HS-005 569 Fld. 2/4; 4/4

APPLYING RESEARCH FINDINGS TO HIGHWAY-DEPARTMENT OPERATIONS. PART 1

by David H. Stevens; R. H. Given; Lewis M. Chittim; Tilton E. Shelburne; John L. Beaton; J. F. Tribble

Published in *Better Roads* v38 n9

p33-6 (Sep 1968)

Highway officials of various states comment on the value of published research reports, research meetings and conferences, and abstracts and articles in publications serving the highway field. Means for applying the results of research are discussed.

Search terms: Highway research; Information systems; Conferences*; State government; Administrative procedures

HS-005 570 Fld. 2/4; 4/4

APPLYING RESEARCH FINDINGS TO HIGHWAY-DEPARTMENT OPERATIONS. PART 2

by D. K. Speer; John J. Lyons; C. K. Preus; W. G. O'Harra; E. M. Johnson; T. C. Reseigh; W. R. Bellis; F. B. Mendenhall

Published in *Better Roads* v38 n10 p29-31, 34-5 (Oct 1968)

Highway officials of various states comment on the value of published research reports, research meetings and conferences, and abstracts and articles in publications serving the highway field. Means for applying the results of research are discussed.

Search terms: Highway research; Information systems; Conferences*; State government; Administrative procedures

HS-005 571 Fld. 2/4

PLANNING SAFETY AND BEAUTY INTO HIGHWAY ACCESS

by Milton Breivogel

Published in *American County Government Journal* p54-6 (June 1967)

Discusses the Los Angeles County General Plan as it applies to various types of highway, freeway, and street design and problems of access. Diagrams are given of front-on design, alley design, service road, side-on cul-de-sac design, and back-up design.

Search terms: Highway design; Controlled access highways; Freeway planning; Los Angeles County*; Streets; Landscape design*

2/4 Design & Construction (Cont.)

HS-005 572 Fld. 2/4

PROPOSED POLICY STATEMENT ON UTILITY ACCOMMODATION ON FEDERAL HIGHWAYS

by J. B. Kemp

Bureau of Public Roads, Washington,
D.C.

Published in *Right of Way* v15 n2
p62-4 (Apr 1968)

Presented at meeting of Chapter 18
of American Right of Way
Association

The proposed policy statement asks
the States to re-examine their existing
utility accommodation policies and to
modify them as necessary to meet
the safe roadside concept. It concerns
new facilities rather than existing
facilities. Massive changes in present
facilities are not planned.

Search terms: Federal aid;
Hazards; Poles (supports); State
government; Highway planning;
Utilities*; Right-of-way (land)
Roadside equipment

HS-005 573 Fld. 2/4

FORCES DUE TO TRAFFIC LOADS ON THE SHEAR CONNECTORS OF SIMPLY SUPPORTED COMPOSITE BRIDGES

by J. S. Teraszkiewicz

England. Road Research Lab.,
Crowthorne, Berks.

1968 24p

Report no. RRL-LR-175; PB-182 736

Loads due to traffic acting on the
shear connectors of composite bridges
(concrete slab on steel I-beam) were
evaluated, using the heaviest type of
vehicle permitted. Calculations were
carried out for various degrees of
connector stiffness found in practice.
As the amount of interaction is
decreased, the loads acting on the
shear connectors are reduced.

Search terms: Steels; Loads
(forces); Traffic volume; Conn-
ectors*; Bridge surfaces; Math-
ematical analysis*; Vehicle weight;
Concrete pavements; Highway
bridges*

AVAILABILITY: CFSTI as PB-182
736

HS-005 623 Fld. 2/4; 4/8

URBAN HIGHWAYS IN PER- SPECTIVE

Automotive Safety Foundation,
Washington, D. C.

10 May 1968 38p

Between 1958 and 1965 the
Automotive Safety Foundation
organized three conferences on high-
ways and urban development, which
formed the nucleus for many
planning and cooperative activities.
This report summarizes these confer-
ences, reviews the many areas of
agreement which form the foundation
for current urban highway programs,
and acknowledges the significant pro-
gress made in the last ten years. It
also suggests steps to overcome new
problems.

Search terms: Highway planning;
Highway design; Transportation
planning; Urban highways; Urban
planning; Community support.

AVAILABILITY: Corporate author

HS-005 624 Fld. 2/4

HIGHWAY SAFETY ELEMENTS IN AESTHETIC DESIGNS

by James A. Head

Bureau of Public Roads, Washington,
D.C. Office of Highway Safety

Published in *Journal of the Highway
Division, Proceedings of the American
Society of Civil Engineers* v92 nHW2,
p15-9 (Oct 1966)

A balance between environment and
safety should be developed in high-
way construction. Cost consciousness
should not be the deciding factor.
Safe roadsides, proper use of guard-
rails, proper placement of signs and
design of their supports, preservation
of natural beauty and added plantings
can all be compatible with highway
safety.

Search terms: Highway construc-
tion; Highway design; Highway
costs; Highway safety; Guardrails;
Highway signs; Road shoulders;
Landscape design*

HS-005 625 Fld. 2/4

SNOWSHED LOCATION AND DESIGN

by Peter A. Schaerer

Published in *Journal of the Highway
Division, Proceedings of the American
Society of Civil Engineers*, v92 nHW2
p21-33 (Oct 1966)

Snowshed is a roof designed to guide
sliding snow across the highway or
railway to protect traffic and prevent
deep snow deposits on the roadway.
It also serves as avalanche defense.
Location and design of snowsheds
must be based on study of the terrain
and frequency and size of avalanches.
Nine design factors are discussed in
relation to the snowsheds for the
Trans-Canada Highway at Rogers
Pass, British Columbia. Long
continuous snowsheds were found
more effective than a number of
short ones with open space between
them.

Search terms: Snow; Snowsheds*;
Avalanches*; Snowdrifts*; Highway
maintenance; Highway planning;
Canada*

HS-005 626 Fld. 2/4

RICH'S HI-DRO CUSHION CELLS: STREET AND HIGHWAY APPLICA- TIONS

Rich (John) Enterprises, Inc.,
Sacramento, Calif.
Mar 1969 15p

Describes a safety device for pro-
tecting stationary objects along
streets and highways. It is a plastic
container filled with water and works
on the same energy-attenuation
concept as the water bumper. A
group of these cells gives excellent
impact protection.

Search terms: Energy absorption;
Hazards; Impact protection; Impact
attenuators*; Hydraulic barriers*;
Barriers

AVAILABILITY: Corporate author

HS-005 653 Fld. 4/8; 2/4

CRITERIA FOR LOCATING MAJOR STREETS AND URBAN FREEWAYS

Anonymous

2/4 Design & Construction

HS-005-653 (Cont.) (Cont.)

Published in *Journal of the Highway Division, Proceedings of the American Society of Civil Engineers* v94 nHW1 p21-32 (Jun 1968)

Report by the Committee on Urban Transportation

The criteria are basically in four fields: planning, traffic engineering, engineering design, and economics. The fifth ingredient essential for proper location is coordination among the various jurisdictions and agencies responsible for transportation in a given urban area.

Search terms: Streets; Urban highways; Highway planning; Urban planning; Traffic engineering; Economic factors; Transportation planning; Government; Freeway planning

HS-005 671 Fld. 2/4

INCREASING THE LOAD-CARRYING CAPACITY OF EXISTING STEEL STRUCTURES

by Charles Kandall

Published in *Civil Engineering* v38 n10 p48-51 (Oct 1968)

A method is presented for increasing load-carrying capacity of structures using tensioning steel and is compared with current standard practice. Method is useful for strengthening bridges or elevated highways to carry heavier vehicles, widening bridges or elevated highways, and repairing bridges, elevated highways, and buildings.

Search terms: Elevated highways; Highway bridges*; Bridges (structures); Steels; Loads (forces); Highway maintenance; Widening*; Vehicle weight

HS-005 672 Fld. 2/4

NEW SOVIET DEVICE FOR MEASURING SKID RESISTANCE OF ROAD SURFACES

by Robert Lukashuk

Published in *Traffic Engineering & Control* v10 n12 p603-5 (Apr 1969)

A portable piece of equipment devel-

oped in the USSR can be operated by leg motion and body weight and accurately records on paper the magnitude of the skid resistance of roads. Such a device can identify hazardous slippery road sections so proper steps can be taken to prevent accidents.

Search terms: Skid resistance; Pavement skidding characteristics; Skid resistance tests; Measuring instruments; USSR*; Accident location; Hazards

HS-005 736 Fld. 2/4

BASIC GRADING—THE KEY TO BETTER HIGHWAYS

by F. W. Cron

Published in *Public Works* v100 n5 p114-7, 40 (May 1969)

Factors in good highway design are discussed and related to grading. Included are costs, slides, cutting and filling, safety, planting of slopes, rounding and warping of slopes, channel changes in streams crossed by highways, cutting trees, and landscaping.

Search terms: Highway design; Highway construction; Landscape design*; Costs*; Trees*; Road grades*; Highway safety; Slopes*; Landslides*

HS-005 737 Fld. 2/4

PUTTING THE RESISTANCE TO SKID

by Gilbert L. Gallatin

Published in *Texas Highways* v16 n6 p22-4 (Jun 1969)

A synthetic aggregate skid-resistant surface was applied to a highway section in Texas. The accident rate has been reduced by 5%. The special overlay will be evaluated to see if its efficiency is maintained for several years. The design of the mixture and its characteristics and costs are described.

Search terms: Texas*; Accident rates; Accident prevention; Aggregates; Highway surfaces; Costs*; Pavement skidding characteristics; Skid resistance; Wear resistance

HS-005 788 Fld. 2/4

NEW SAFETY GROOVING

SYSTEM—HOW IT WORKS FOR ROADS, RUNWAYS

Anonymous

Published in *Roads and Streets* v112 n7 p92-3 (Jul 1969)

A pavement grooving machine has been developed to reduce skidding accidents. The machine cuts into the surface, provides better traction, and creates multiple conduits allowing water to flow off, largely eliminating the smooth film of water. Tests on highways have showed an 80 to 90 percent drop in wet weather accidents after grooving.

Search terms: Grooving*; Pavement skidding characteristics; Runways; Wet skidding; Wet road conditions; Accident rates; Highway surfaces; Skidding accidents

HS-005 789 Fld. 2/4

DEPARTMENT TESTS NEW INNOVATIONS IN GUARDRAILS

Anonymous

Published in *Minnesota Highways* v17 n4 p5-6 (Summer 1969)

Describes crash tests on Minnesota's standard cable guardrail system to determine whether the system was deficient and whether timber instead of steel posts would be suitable. Timber posts were chosen for better visibility and economy. Test results indicated the system would be satisfactory and would subject car occupants to forces well within human tolerance levels to impact.

Search terms: Guardrails; Impact tests; Impact tolerance; Wood*; Poles (supports); Steels; Visibility; Costs*; Minnesota*

HS-005 866 Fld. 2/4

THE EFFECT OF REPEATED ROLLING OF ELASTO-PLASTIC ROADS

by W. O. Yandell

Published in *Australian Road Research* v3 n7 p14-20 (Sep 1968)

A simulation technique is used to determine the flow and residual stress behavior in an elasto-plastic road material subjected to repeated rolling.

2/4 Design & Construction (Cont.)

HS-005-866 (Cont.)

The difference in the behavior of the cumulative deformation, the residual stress and the rolling resistance under pneumatic and under rigid tire rolling was demonstrated. An explanation for the formation of corrugations and other deformations in flexible pavements was suggested.

Search terms: Pneumatic tires; Wear resistance; Flexible pavements; Stresses; Loads (forces); Road surface tests; Simulation; Damage; Rolling; Tire-road conditions; Plastic properties*; Mathematical analysis*

HS-005 868 Fld. 3/4; 5/4; 2/4

HUMAN FACTORS IN THE CONTROL OF ROAD VEHICLES

by I. D. Brown

Published in *Electronics & Power* v14 p275-9 (Jul 1968)

Human factors are the main cause of accidents. Major safety improvements can be made only if vehicle manufacturers and transportation administrators achieve an acceptable match between the characteristics of man, machine, and environment. The design of the driver's control instruments, the ability to judge speed, risk taking behavior, driver intoxication, road signs, problem drivers, and automatic guidance of cars are discussed.

Search terms: Human factors engineering; Man machine systems; Accident causes; Highway safety; Environmental factors; Instrument panels; Automobile design; Safety design; Speed; Risk taking*; Driver intoxication; Drinking drivers; Signs (displays); Problem drivers; Automatically guided automobiles; Highway signs

HS-005 898 Fld. 2/4

A REPORT ON THE SAFETY ROADSIDE REST PROGRAM AS REQUESTED BY HOUSE RESOLUTION NO. 570 IN THE 1967 REGULAR SESSION OF THE LEGISLATURE

California. Div. of Highways,

Sacramento

Mar 1968 42p

Safety roadside rests include parking areas, comfort stations, picnic tables, trash receptacles, water supply, and protection from weather. Public acceptance has been enthusiastic, and additional facilities are recommended. Costs are given and additional improvements discussed.

Search terms: California*; Rest areas*; Highway design; Costs*; Roadside parking; Roadside equipment; Recreational facilities*; Consumer acceptance*

AVAILABILITY: Corporate author

HS-005 943 Fld. 2/4

HIGHWAYS DESIGNED FOR SAFETY

by E. E. Halmos, Jr.

Published in *Civil Engineering* v37 n9 p50-3 (Sep 1967)

Engineers can and must do better to build safety into highways. In this interview with Rep. John A. Blatnik (D. Minn.) the objectives of the Special Subcommittee on the Federal-Aid Highway Program are detailed. The challenge to highway engineering is to avoid building in hazards and to correct, rather than just replace, those that cause accidents. Results of hearings before this committee are listed.

Search terms: Hazards; Highway safety; Highway design; Accident factors; Accident causes; Guardrails; Breakaway bases*; Safety engineering; Interstate Highway System; Safety design

HS-005 944 Fld. 2/4

A SKID RESISTANCE STUDY IN FOUR WESTERN STATES

by John A. Mills

Published in *HRB Special Report* n101 p3-17 (1969)

Report no. NAS-NRC-Pub-1460; HRB-SR-101

Paper in Proceedings of the HRB Western Summer Meeting cosponsored by the Colorado Dept. of

Highways, Denver, Aug 12-13, 1968.

The purpose of this study was to compare the skid-resistance values of plant-mix seals with those obtained from other conventional surface types, and to show comparisons and trends of skid resistance based on such variables as ADT, age, asphalt content, and type and grade of aggregate used on roads throughout Colorado, Wyoming, Utah, and New Mexico. It was concluded that bituminous plant-mix seals provide the best skid-resistance surface, both as overlay on existing surfaces and for new pavements.

Search terms: Skid resistance; Pavement skidding characteristics; Bituminous concretes; Concrete pavements; Wear resistance; Surface treatments*; Performance tests; Aggregates; Colorado*; Wyoming*; Utah*; New Mexico*; Materials tests

HS-005 945 Fld. 2/4

DEVELOPMENT AND RESULTS OF A SKID RESEARCH AND ROAD INVENTORY PROGRAM IN PENNSYLVANIA

by Leo D. Sandvig; Louis M. MacGregor; Richard K. Shaffer

Published in *HRB Special Report* n101 p18-34 (1969) 21 refs

Report no. NAS-NRC-Pub-1460; HRB-SR-101

Paper in Proceedings of the HRB Western Summer Meeting cosponsored by the Colorado Dept. of Highways, Denver, Aug 12-13, 1968.

The Pennsylvania Department of Highways initiated a statewide annual skid survey in 1963. The scope of past and current research is described briefly. The results of these surveys are presented with recommendations concerning skid-resistant surfaces.

Search terms: Skid resistance; Pavement surface texture; Concrete pavements; Friction; Pennsylvania*; Wear resistance; Abrasion resistance; Pavement skidding characteristics; Aggregates; Test equipment

2/4 Design & Construction (Cont.)

HS-005 946 Fld. 2/4

RECOMMENDATIONS FOR AN INTERNATIONAL MINIMUM SKID-RESISTANCE STANDARD FOR PAVEMENTS

by Desmond F. Moore

Published in *HRB Special Report*
n101 p35-8 (1969) 12 refs

Report no. NAS-NRC-Pub-1460;
HRB-SR-101

Paper in Proceedings of the HRB
Western Summer Meeting cospon-
sored by the Colorado Dept. of
Highways, Denver, Aug 12-13,
1968.

The need for minimum international
skid-resistance requirements on roads
and highways is apparent from acci-
dent statistics in several countries.
The variables of present test proce-
dures make implementation of inter-
national standards difficult. It is
recommended that a standard should
specify minimum coefficients of fric-
tion at two distinct speeds.

Search terms: Skid resistance; Wet
skidding; Skidding; Pavement skid-
ding characteristics; Standards; Fric-
tion; Speed; Road surface tests

HS-005 947 Fld. 2/4; 5/22

THE LOGICAL DESIGN OF OPTI- MUM SKID-RESISTANT SURFACES

by Desmond F. Moore

Published in *HRB Special Report*
n101 p39-45 (1969) 11 refs

Report no. NAS-NRC-Pub-1460;
HRB-SR-101

Paper in Proceedings of the HRB
Western Summer Meeting cospon-
sored by the Colorado Dept. of
Highways, Denver, Aug 12-13,
1968.

Friction properties of pavements have
been studied as they relate to speed.
A logical sequence for the design of
optimum skid-resistant pavements for
roads and runways is suggested. It is
concluded that the mean wavelength
and slope of texture is chosen from
drainage requirements at the average
maximum speed or design speed limit
for the particular pavement. Inter-
action between tires and roads in

flooded and damp conditions is
included.

Search terms: Wet skidding;
Speed; Tire-road conditions; Fric-
tion; Skid resistance; Pavement
surface texture; Highway design;
Wet road conditions; Road design
speed; Road drainage; Slopes*

HS-005 948 Fld 2/4

PAVEMENT FRICTION AND TEM- PERATURE EFFECTS

by W. E. Meyer; H. W. Kummer

Published in *HRB Special Report*
n101 p47-55 (1969) 11 refs

Report no. NAS-NRC-Pub-1460;
HRB-SR-101

Paper in Proceedings of the HRB
Western Summer Meeting cospon-
sored by the Colorado Dept. of
Highways, Denver, Aug 12-13,
1968.

To understand the effect that temper-
ature has on pavement friction, the
adhesion and hysteresis components
are separated and their temperature
dependence is studied independently.
Field and laboratory tests made with
skid trailers confirm the temperature
dependence of friction.

Search terms: Temperature; Fric-
tion; Rubber*; Skid resistance;
Tire-road conditions; Pavement
skidding characteristics; Field tests;
Laboratory tests

HS-005 949 Fld. 2/4

RELATION BETWEEN WEAR AND PHYSICAL PROPERTIES OF ROADSTONES

by A. Kent Stiffler

Published in *HRB Special Report*
n101 p56-68 (1969) 16 refs

Report no. NAS-NRC-Pub-1460;
HRB-SR-101

Paper in Proceedings of the HRB
Western Summer Meeting cospon-

sored by the Colorado Dept. of
Highways, Denver, Aug 12-13,
1968.

One aspect in the skid-resistant life of
a pavement is the polishing of road-
stones by abrasives on the road. In
this experiment ten mineral samples
were held against the rubber tracks of

a rotating drum in the presence of
dry fine abrasives. Three loads and
speeds were tested for each of three
different abrasives. The significant
aspect of this wear study is that hard
minerals were worn with abrasives of
comparative hardness.

Search terms: Wear resistance;
Abrasion resistance; Skid resistance;
Laboratory tests; Friction; Tire-
road conditions; Mineral aggre-
gates*; Pavement skidding
characteristics; Materials tests

HS-005 950 Fld. 2/4

PRE-EVALUATION OF PAVEMENT MATERIALS FOR SKID RESISTANCE--A REVIEW OF U.S. TECHNIQUES

by W. A. Goodwin

Published in *HRB Special Report*
n101 p69-79 (1969) 15 refs

Report no. NAS-NRC-Pub-1460;
HRB-SR-101

Paper in Proceedings of the HRB
Western Summer Meeting cospon-
sored by the Colorado Dept. of
Highways, Denver, Aug 12-13,
1968.

Reviews existing laboratory methods
used for studying pavement materials
as related to their skid-resistant qual-
ities. Test equipment and testing tech-
niques along with examples of data
are described. Additional work is
needed to relate laboratory results to
field performance.

Search terms: Pavement surface
texture; Pavement skidding charac-
teristics; Laboratory tests; Skid
resistance tests; Materials tests;
Wear resistance; Highway construc-
tion; Test equipment

HS-005 951 Fld. 2/4; 5/22

FACTORS AFFECTING SKID RESISTANCE AND SAFETY OF CONCRETE PAVEMENTS

by B. E. Colley; A. P. Christensen;
W. J. Nowlen

Published in *HRB Special Report*
n101 p80-99 (1969) 38 refs

Report no. NAS-NRC-Pub-1460;
HRB-SR-101

Paper in Proceedings of the HRB
Western Summer Meeting cospon-

2/4 Design & Construction (Cont.)

HS-005-951 (Cont.)

sored by the Colorado Dept. of Highways, Denver, Aug 12-13, 1968.

The role of the tire and the pavement in reducing skidding accidents is discussed. Interaction between the tire rubber characteristics of adhesion and hysteresis and the pavement surface texture is considered. Wear-resistant fine aggregate should be chosen and a proper mix design and finishing method used to produce the desired texture depth. Procedures for restoring skid resistance to slippery pavements are also described.

Search terms: Skidding accidents; Pavement skidding characteristics; Skid resistance; Concrete pavements; Pavement surface texture; Accident prevention; Tire-road conditions; Friction; Tire treads; Tire characteristics; Wear resistance; Aggregates; Highway construction; Highway maintenance; Surface treatments*

HS-005 952 Fld. 2/4

TEXTURING OF CONCRETE PAVEMENT

by D. L. Spellman

Published in *HRB Special Report* n101 p100-3 (1969)

Report no. NAS-NRC-Pub-1460; HRB-SR-101

Paper in Proceedings of the HRB Western Summer Meeting cosponsored by the Colorado Dept. of Highways, Denver, Aug 12-13, 1968.

Preliminary work by California on texturing and surface treatments of concrete pavements is described. Texture patterns were formed into the surface of laboratory-cast slabs. Skid tests were performed to select patterns which were field tested on freeways.

Search terms: Concrete pavements; Skid resistance tests; Pavement skidding characteristics; Surface treatments*; Laboratory tests; Highway maintenance; Highway construction; California*; Pavement surface texture; Road surface tests; Freeways

HS-005 953 Fld. 2/4

CONSTRUCTION OF NONSKID PAVEMENT SURFACES

by Leigh S. Spickelmire

Published in *HRB Special Report* n101 p104-9 (1969)

Report no. NAS-NRC-Pub-1460; HRB-SR-101

Paper in Proceedings of the HRB Western Summer Meeting cosponsored by the Colorado Dept. of Highways, Denver, Aug 12-13, 1968.

This examination into the relationship of construction procedures and skid-resistant pavement surfaces covers: the nature of the problem; a review of construction procedures for asphalt-concrete paving, portland cement concrete paving and grooving existing concrete paving.

Search terms: Highway construction; Concrete pavements; Grooving*; Skid resistance; Surface treatments*; Portland cements*; Asphalt pavements*; Pavement skidding characteristics; Pavement surface texture

HS-005 954 Fld. 2/4; 1/3

REDUCTION OF ACCIDENTS BY PAVEMENT GROOVING

by John L. Beaton; Ernest Zube; John Skog

Published in *HRB Special Report* n101 p110-25 (1969) 6 refs

Report no. NAS-NRC-Pub-1460; HRB-SR-101

Paper in Proceedings of the HRB Western Summer Meeting cosponsored by the Colorado Dept. of Highways, Denver, Aug 12-13, 1968.

Providing and maintaining a skid-resistant surface on concrete pavements is discussed. Studies of the effect of grooving the pavement to reduce wet weather accidents were conducted. Results show that pavement grooving parallel to the centerline will reduce the wet weather accident rate.

Search terms: Accident prevention; Grooving*; Skid resistance; Wet skidding; Accident rates; Concrete pavements; California*; Wet

road conditions; Pavement skidding characteristics; Friction; Accident rates

HS-005 955 Fld. 2/4; 5/22

WHEEL LOAD EQUIVALENCY BASED ON FLEXURAL FATIGUE OF ASPHALTIC CONCRETE

by R. A. Jimenez

Published in *HRB Special Report* n101 p129-35 (1969) 16 refs

Report no. NAS-NRC-Pub-1460; HRB-SR-101

Paper in Proceedings of the HRB Western Summer Meeting cosponsored by the Colorado Dept. of Highways, Denver, Aug 12-13, 1968.

This presentation is concerned with an approach for estimating wheel load equivalencies based on a particular flexure fatigue characteristic of asphaltic concrete. The equivalencies are referred to as destructive ratios. The approach for determining the destructive ratio is described for single-wheel applications of variable loads and tire pressures on pavement structures of different strengths.

Search terms: Stresses; Fatigue (materials); Wheels; Loads (forces); Wear resistance; Pavement surface texture; Concrete pavements; Tire-road conditions; Fatigue tests; Damage

HS-005 956 Fld. 2/4

THERMAL FRACTURE PHENOMENA IN BITUMINOUS SURFACES

by R. C. G. Haas; T. H. Topper

Published in *HRB Special Report* n101 p136-53 (1969) 26 refs

Report no. NAS-NRC-Pub-1460; HRB-SR-101

Paper in Proceedings of the HRB Western Summer Meeting cosponsored by the Colorado Dept. of Highways, Denver, Aug 12-13, 1968.

The phenomenon of thermally induced cracking in bituminous surfaces is explored as a problem primarily associated with design. The hypothesis is that thermally induced cracking occurs in two phases; limited depth crack initiation and full-depth propagation with rising air temperatures. Practical implications suggest

2/4 Design & Construction

HS-005-956 (Cont.) (Cont.)

more efficient and economical uses of available materials in designing for the low-temperature cracking problem.

Search terms: Cracking (fracturing)*; Pavement surface texture; Wear resistance; Winter*; Highway construction; Bituminous concretes; Mathematical analysis*; Stresses; Temperature; Thermal measurements*; Damage

HS-005 957 Fld. 2/4

PAVEMENT CRACKING: CAUSES AND SOME PREVENTIVE MEASURES

by Chester McDowell

Published in *HRB Special Report* n101 p154-62 (1969) 9 refs

Report no. NAS-NRC-Pub-1460; HRB-SR-101

Paper in Proceedings of the HRB Western Summer Meeting cosponsored by the Colorado Dept. of Highways, Denver, Aug 12-13, 1968.

The pavement cracking problem was investigated with respect to deep seated movements and also from the standpoint of "shrinkage cracking" due to the inherent properties of road-building materials. Recommendations are made to prevent some of the potential hazards associated with cracking.

Search terms: Pavement surface texture; Wear resistance; Highway construction; Cracking (fracturing)*; Performance characteristics; Highway maintenance; Materials tests; Laboratory tests; Damage

HS-005 958 Fld. 2/4

REDUCTION IN TRANSVERSE PAVEMENT CRACKING BY USE OF SOFTER ASPHALT CEMENTS. OUTLINE OF PAPER.

by Normal W. McLeod

Published in *HRB Special Report* n101 p163-70 (1969)

Report no. NAS-NRC-Pub-1460; HRB-SR-101

Paper in Proceedings of the HRB Western Summer Meeting cosponsored by the Colorado Dept. of

Highways, Denver, Aug 12-13, 1968.

Low-temperature transverse pavement cracking is currently the most serious asphalt pavement performance problem in Canada. Reduction can be achieved by the use of softer asphalt cements. Evidence is presented which supports continued grading by penetration at 77 F rather than by viscosity at 140 F.

Search terms: Canada*; Temperature; Pavement surface texture; Wear resistance; Highway construction; Cracking (fracturing)*; Performance characteristics; Materials tests; Road surface tests; Damage; Asphalt pavements*

HS-006 015 Fld. 2/4

AN EXPERIMENT WITH EVER-GREEN TREES IN EXPRESSWAY MEDIANS TO IMPROVE ROADWAY DELINEATION

by John W. Hutchinson, Janis H. Laci

Illinois. Dept. of Public Works and Buildings, Springfield. Div. of Highways

1965 29 p 15 refs

Simulated median plantings were installed on selected portions of two Chicago expressways to determine whether such a means of providing roadway delineation would significantly reduce the frequency of vehicle encroachment on the median. There was a significant reduction in the frequency of encroachment on the medians of both expressways, with the greatest reductions occurring on or near curved alignment where the hazard headlight glare from opposing vehicles had previously been greatest. The findings suggest the possibility of substantial improvement in the safety of divided highways through development and use of median plantings.

Search terms: Plants*; Trees*; Medians (dividers); Delineators (traffic)*; Glare reduction; Road curves; Freeways; Accident prevention; Safety design; Highway safety

AVAILABILITY: Corporate author

HS-006 016 Fld. 2/4; 1/3

CURVE DELINEATION AND ACCIDENTS. AN EVALUATION OF CURVE DELINEATION BY ACCIDENT ANALYSIS

by William C. Taylor, Thomas J. Foody

Ohio. Dept. of Highways, Columbus. Bureau of Traffic

Jan 1966 34p
Report no. 1-14866

This study determines the effectiveness of curve delineation in reducing accidents. Statistical tests were used to evaluate the effectiveness of various programs on a two year before and after analysis of accidents. The parameters tested were degree of curvature, central angle, the combination of degree of curvature and central angle, and type of accident. It was determined that a program of curve delineation based solely on degree of curvature (Ohio's program) was an effective, but not an efficient program. The central angle provides a better measure of delineation effectiveness than does the degree of curvature. A more efficient program was outlined and warrants for this new program specified.

Search terms: Road curves; Accident prevention; Accident types; Statistical analysis; Highway design; Delineators (traffic)*; Safety design; Reflectors; Chi square test

2/4 Design & Construction (Cont.)

HS-006 105 Fld. 2/4

THE ROAD SURFACE AND SAFETY OF VEHICLES

by B. E. Sabey

England. Road Research Lab., Crowthorne, Berks.

Published in *Proceedings of the Institution of Mechanical Engineers* v183 pt3A pl-11 (1968) 8 refs

Paper 2 presented at Vehicle and Road Design for Safety Symposium, Cranfield, 3-4 Jul 1968.

Methods of measuring the skidding resistance of road surfaces are described, with particular emphasis on the interpretation of results in relation to accident risk and on the minimum requirements for safety under different road conditions. The features of road surface texture which give these requirements are outlined and results of field surveys show the extent to which the requirements are met at the present time. The influence of tire tread characteristics on the frictional properties of road surfaces is also discussed.

Search terms: Accident risks; Wet skidding; Tire treads; Wet road conditions; Dry road conditions; Icy road conditions; Skidding accidents; Skid resistance; Tire characteristics; Accident rates; Tire-road conditions; Pavement surface texture; Road surfaces; Pavement skidding characteristics

HS-006 106 Fld. 2/4; 4/8

PRELIMINARY THOROUGHFARE PLAN, ANDERSON, SOUTH CAROLINA

Harland Bartholomew and Associates, Atlanta, Ga.

Apr 1968 51p
Proj. HUD-SC-P-8 (G)
Report no. PB-179 564

Thoroughfare characteristics, traffic flow, travel time, accident history, and land use information are used to determine existing problems. Traffic flow of 1985 is estimated and future needs determined from a capacity-deficiency analysis. Recommendations for improvements to existing streets and highways and development of

new ones are made.

Search terms: Highway planning; Streets; South Carolina*; Traffic flow; Travel time; Land use; Accident rates; Urban planning

AVAILABILITY: CFSTI as PB-179 564

HS-006 134 Fld. 4/8; 2/4

A NEW CONCEPT IN HIGHWAY DESIGN

by Wesley R. Bellis

New Jersey. Dept. of Transportation, Trenton

(1967) 113p

Pertinent trends for accidents, injuries, and fatalities are projected for the year 2025. A solution to the traffic safety problem abandons existing road systems. Networks of one-way freeways would be established: "A-ways" for major through service and express subway service; "B-ways" for intermediate roads and subways; "C-ways" for bus service and land service roads. Pedestrian movement and parking are completely isolated. Benefits justify a projected expenditure of \$700,000,000 per year over a 50 year period for New Jersey. The benefit cost ratio was shown to be 40:1. Costs of construction could easily be paid out of the savings in reduced insurance premiums during the 50 years.

Search terms: Traffic safety; Transportation planning; Fatalities; Injuries; New Jersey*; Highway design; Costs*; Public transportation; Forecasting; Freeways; Accident rates; Benefit cost analysis*; Parking; Pedestrian-vehicle interface; Insurance rates*

AVAILABILITY: Corporate author

HS-006 172 Fld. 2/4

THREE IMPORTANT QUESTIONS IN GRADE CROSSING SAFETY

by Carlton C. Robinson

Published in *Traffic Digest and Review* v17 n8 p16-7 (Aug 1969)

The three questions concern: (1) A rational goal in grade crossing safety; (2) The course of action with the highest probable pay-off ratio; (3)

Changing driver behavior to reduce grade crossing accidents. A goal of zero deaths is attainable for \$86 billion by separating every rail-highway crossing in the United States. Alternative safety measures are discussed.

Search terms: Railroad grade crossings*; Highway signs; Driver behavior; Safety design; Safety programs; Highway design; Costs*; Accident prevention; Visibility; Warning systems; Signal devices

HS-006 173 Fld. 2/4

GRADE CROSSINGS. AN OLD HAZARD TO TRAFFIC SAFETY CONTINUES TO CREATE PROBLEMS

by Cullison Cady

Published in *Highway User* p28-9 (May 1969)

Problems encountered with rail-highway grade crossing accidents are discussed. A new factor—the advent of the modern high speed train—suggests the need for new base data and improvement in the reliability of electric signal systems. Recommendations are offered which may reduce the frequency and severity of grade crossing accidents.

Search terms: Railroad grade crossings*; Accident prevention; Hazards; Grade crossings (highways)*; Warning systems; Signal devices

HS-006 174 Fld. 2/4

HIGHWAY LANDSCAPING—SAFE- GUARD OR HAZARD?

by K. D. Curtis

Published in *Traffic Safety* v64 n10 p8-9, 39-40 (Oct 1964)

Modern landscaping techniques are described which will provide both beauty and safety along the roadways. Care is needed to avoid the use of trees and shrubs which break in snow, are too identical and cause highway hypnosis, or have other disadvantages. Suitable species cut down glare, beautify the highway, and contribute to highway safety.

Search terms: Highway design Landscape design*; Highway safety

2/4 Design & Construction (Cont.)

HS-006-174 (Cont.)

Trees*; Hazards; Snow; Glare
Visibility; Highway hypnosis*

HS-006 199 Fld. 4/3; 2/4; 5/20

ECONOMICS OF TRUCK OPERATIONS IN URBAN AREAS

by J. M. Owens

Published in *Australian Road Research Board Proceedings of the Conference*, Sydney, v2 P11/p34-55 (1964)

18 refs

Report no. Paper-177

Includes discussion and author's closure to discussion.

A pilot speed-and-delay study was made in Melbourne to determine the effects of traffic congestion, small shipments, and industrial scatter on urban area freight transport. Consolidation of freight at source and the consequent use of articulated vehicles seemed to offer the greatest savings potential. Suggestions for the planning of freeways that would permit the use of these vehicles, and of industrial parks which would include a satellite freight terminal are given. Mention is made of the findings of some American urban studies.

Search terms: Benefit cost analysis*; Melbourne*; Articulated vehicles*; Cargo transportation; Freight traffic; Traffic congestion; Central business districts; Urban planning; Freeway planning; Industrial parks*; Time factors*; Economic analysis; Trucks

HS-006 219 Fld. 2/4

CRASH BARRIERS FOR SAVING LIFE AND LIMB

by Stuart Bladon

Published in *Autocar* v130 n3822 p6-7 (15 May 1969)

A new design in crash barriers uses energy absorbing posts mounted on pivoted supports. These supports enclose hydraulic shock absorbers similar to the telescopic dampers used in a car's suspension. When struck by a car the barrier is deflected, the blow is cushioned, and no repairs to the barrier are required.

Search terms: Impact tests; Energy absorption; Hydraulic equipment; Shock absorbers; Barrier design; Injury prevention

HS-006 220 Fld. 2/4

CONCRETE BARRIERS SAVE LIVES

Anonymous

Published in *Better Roads* v39 n6 p31-2 (Jun 1969)

The "safety shape," an 18 to 36 inch concrete barrier, has resulted in spectacular reductions in accidents and injuries on older multilane highways. Upon impact the vehicle is decelerated and lifted, its path redirected to parallel the barrier. A reduction in head-on collisions may be expected if the safety barrier—already planned for 34 states and provinces—is successfully developed. Installation and tests in New Jersey, California, and North Carolina are described.

Search terms: Head on collisions; Accident prevention; Impact tests; Median barriers; Barrier design; New Jersey; North Carolina; Injury prevention; California; Energy absorption

HS-006 221 Fld. 2/4; 5/1

SOME MEASUREMENTS OF BRAKING FORCE COEFFICIENT ON SIX AIRFIELD TEST SURFACINGS

by G. C. Staughton

England. Road Research Lab., Crowthorne, Berks.

1969 28p 5 refs

Report no. RRL-LR-225; PB-184 170

A series of runway tests was conducted to assess the skid resistance in wet conditions of a range of airfield surfacings. Locked wheel and peak braking force coefficients were measured for three concrete and three asphalt surfaces using the heavy load test vehicle fitted with an aircraft tire. Two of the concrete and one of the asphalt surfaces had been grooved, another asphalt surface had been surface dressed to improve their skidding resistance. It was found that the treatments given to both the concrete and the asphalt surfaces were beneficial in improving skidding resistance; peak coefficients were substantially greater than the locked

wheel coefficients; increasing the inflation pressure of the test tire reduced the peak coefficients; and the greatest tire damage was produced by the surface dressed asphalt and scored concrete surfaces.

Search terms: Skid resistance; Runways; Inflation pressure; Wet skidding; Surface treatments; Skid resistance tests; Aircraft tires; Grooving; Braking; Wheel locking; Tire performance; Tire wear; Tire tests; Concrete pavements; Asphalt pavements

AVAILABILITY: CFSTI as PB-184 170

HS-006 222 Fld. 2/4

VEHICLE OPERATING CHARACTERISTICS ON OUTER LOOP DECELERATION LANES OF INTERCHANGES

by Merritt M. Davis; K. M. Williams
Toronto Univ., Ont. (Canada). Dept. of Civil Engineering

Mar 1968 90p 40 refs
Report no. OJHRP-43

Prepared in cooperation with Ontario Dept. of Highways as part of the Ontario Joint Highway Research Programme.

Operation characteristics—headways, lateral placements, and decelerations—were studied to determine adequacy of, and the driver behaviour patterns on, existing interchange exit facilities. During peak volume conditions 1574 vehicle movements were observed at six locations on a Toronto expressway. Evidence indicated that: deceleration lanes are not being used as intended; pavement widths of cloverleaf outer ramps are wider than necessary; exits with the least amount of curvature would appear to satisfy motorists. This study also determined validity of the photographic method as a means of studying traffic behaviour.

Search terms: Freeways; Highway design; Driver behavior; Exits; Ramps; Cloverleaf ramps; Peak hour traffic; Photography; Traffic data analysis; Headway; Speed patterns; Deceleration patterns; Road curves; Traffic characteristics; Toronto

AVAILABILITY: Corporate author

2/4 Design & Construction (Cont.)

HS-006 223 Fld. 2/4; 1/4

CALIFORNIA DESIGNS FOR SAFETY AND AESTHETICS

by Kenneth R. MacDonald

Published in *Better Roads* v38 n10
p17-9 (Oct 1968)

Emphasizing good design, the California Division of Highways is rebuilding nearly 2,000 accident-concentration locations on the state highway system. When the \$47 million job is done, state highway engineers estimate there will be approximately 5,000 fewer accidents a year on California highways. Highway bridge design is discussed.

Search terms: California; Accident prevention; Accident location; Highway design; Safety design; Bridges (structures); Hazards; Landscape design; Highway bridges

HS-006 282 Fld. 2/9; 2/4

REFLECTIVE DEVICES AS AIDS TO NIGHT DRIVING

by J. A. Reid; J. W. Tyler

Published in *Highways and Traffic Engineering* v37 n1715 p34-42 (Jul 1969) 9 refs

Light may be reflected in three ways: direct, diffuse, or reflex. As aids to night driving the following types of reflective devices are discussed: reflective road signs, curbs, road and edge markings, and road studs. This article considers remedial treatment, assessments of reflecting devices, brightness measurements, and factors causing temporary loss of reflectivity.

Search terms: Reflecting surfaces; Traffic markings; Traffic signs; Night driving; Visibility; Brightness; Highway signs; Curbs

HS-006 310 Fld. 4/3; 2/4; 4/8

THE ECONOMIC FEASIBILITY OF AN EXPANDED ROADS PROGRAMME

by N. F. Clark

Published in *Australian Road Research Board Proceedings of the Third Conference*, Sydney, v2 p1 p56-85 (1964) 11 refs

Includes discussion and author's closure to discussion.

An attempt is made to show how a road construction program can be economically justified and a study of costs and benefits may help determine priorities. The place of roads expenditure in the national economy, the history of allocation of resources to roads, and its future trends are discussed. The National Association of Australian State Road Authorities needs survey and its recommendations are noted. Methods of financing road expenditures are explored.

Search terms: Benefit cost analysis; Highway construction; Economic analysis; Australia; National Assoc. of Australian State Road Authorities; Highway costs; Transportation planning; Highway planning

HS-006 328 Fld. 1/3; 2/4; 1/4

TRAFFIC ENGINEERING TO REDUCE ACCIDENTS

by Kenneth W. Anderson

Published in *Traffic Engineering* v39 n12 p48-53 (Sep 1969)

A program for seeking out and improving high accident locations is described. The type of study necessary to identify accident locations is discussed. The procedure for determining what improvements are necessary to reduce accidents is stressed, involving study of accident types and patterns. Development of priorities for expenditures is also needed, and should include study of the cost of accidents. Application of this program in Utah is outlined.

Search terms: Accident location; Accident types; Accident analysis; Accident causes; Accident prevention; Costs; Utah; Highway maintenance; Highway characteristics; Benefit cost analysis

HS-006 332 Fld. 2/4; 1/3

STUDIES OF MEDIANS IN DEVEL- OPED AREAS

by Karl Moskowitz

Published in *Highway Research News* n13 p30-43 (Jun 1964)

A study was made in 1960 by the California Division of Highways to determine a policy concerning medians in developed areas. Accident

data were compiled on 21 sections of a state highway, of which 12 had curbed medians, and 9 had painted medians. Accident rates for divided highways, whether curbed or painted, are comparable.

Search terms: Highway design; Median barriers; Accident rates; California*; Intersections; Fatalities; Injuries; Divided highways; Urban highways; Medians (dividers)

HS-006 333 Fld. 2/4

HE'S SKIDDING AND THAT'S NO JOKE

by Francis X. Schwartz

Published in *American Road Builder* v46 n8 p10-2 (Aug 1969)

A general outline of skid research dealing with roads and runways is presented. Skid research has emphasized characteristics of different types of pavement aggregate, surface finishing in concrete pavements, pavement grooving, paving mix proportions, surface additives, tire design and materials, and other factors such as environmental conditions and hydro-planing. Equipment used in skid research is described.

Search terms: Skidding; Skid resistance tests; Vehicle stability; Runways; Aggregates; Test equipment; Concrete pavements; Tire-road conditions; Pavement skidding characteristics; Grooving; Surface treatments; Tire design; Environmental factors; Wet skidding

HS-006 334 Fld. 2/4; 2/1

FULL-SCALE IMPACT TESTS ON LOW-COST BARRIER SYSTEMS, LIGHTING POLES AND SIGN SUPPORTS, 1967

by M. D. Armstrong; P. Smith; M. Wolkowicz; R. G. Jasper

Ontario. Dept. of Highways, Downsview (Canada)

Jun 1968 48p

Report no. DHO-IR22

Impact tests were made on guide-rail systems for rural highways. Vehicles hit the barrier at 50 mph at an angle of 25 degrees. An effective post and cable system could be developed from three 1/2 in. steel cables on 6 in. cedar posts at 12 ft. centers with

2/4 Design & Construction (Cont.)

HS-006-334 (Cont.)

special provisions for tensioning and anchoring the cables. More costly steel beams were not as effective. Advantages of break-away bases for lighting poles and sign supports were confirmed.

Search terms: Median barriers; Rural highways; Poles (supports); Breakaway bases; Wood; Impact tests; Steels; Highway lighting

AVAILABILITY: Corporate author

HS-006 388 Fld. 2/4

SKID TESTING

by E. A. Whitehurst

Published in *Materials Research and Standards* v9 n4 p20-4 (Apr 1969) 22 refs

This paper summarizes developments in the field of pavement skid resistance testing in the United States from the early 1920's until the present time. The principal techniques—locked wheel stopping distance, the decelerometer, and skid trailer—are described. Only the towed skid trailer appears to meet present and future needs of state highway departments. Recommendations are made concerning a skid trailer system to be used in wide-scale survey testing to meet safety standards.

Search terms: Skid resistance; Pavement skidding characteristics; Skid resistance tests; Safety standards; Road surface tests; Test equipment; Wheel locking; Stopping distance; Trailers; Deceleration

HS-006 393 Fld. 3/4; 2/4

THE DESIGN OF THE VISUAL FIELD IN STREETS: THE VISUAL ENGINEER'S CONTRIBUTION

by J. M. WalDRAM

Published in *Illuminating Engineering Society. Transactions (London)* v31 n1 p7-26 (1966) 18 refs

Good visual design must consider the whole perspective of the scene and the relation of the components to the whole. Streets are used for so many

conflicting activities that effective design of the visual field is not possible. The most serious problems in present streets arise from their use as markets, especially at night when road users are hindered by commercial lighting and signs. Suggestions for restricting advertising signs and improving traffic signs are made.

Search terms: Streets; Street lighting; Traffic signs; Signs (displays); Visibility; Urban planning; Pedestrians; Highway planning; Human factors engineering; Field of view

HS-006 444 Fld. 2/4

THE NEED FOR SAFETY BARRIERS

Anonymous

Published in *Autocar* v130 n3822 p8 (15 May 1969)

Comments on an article from the Touring Club de France Magazine.

Contrasts philosophies of the Touring Club (of France) and the Road Research Laboratory (England) concerning the erection of safety barriers on existing roads versus the investment in extra mileage of new expressways. Two types of barriers are advocated by the Touring Club: (1) the Dahl barrier of corrugated sections which can straighten out the direction of a vehicle swerving into it; and (2) the Kraemer barrier made of cross strands inclined to the horizontal which redirects a vehicle into its proper lane.

Search terms: Accident prevention; Barriers; Barrier design; Guardrails; Head on collisions; France; Great Britain

HS-006 445 Fld. 2/4

HYDRAULIC-PLASTIC CUSHIONS FOR ATTENUATION OF ROAD-SIDE BARRIER IMPACTS

by Charles Y. Warner

Published in *Highway Research Record* n259 p24-34 (1969) 19 refs

Presented at the -48th Annual Meeting of the Highway Research Board.

A review of accident experience shows that collision with fixed highway obstacles is an important factor.

Cushions constructed of water-filled plastic cells have been tested and found effective in reducing the severity of barrier impacts. Some aspects of the cellular cushion construction are presented in the light of design flexibility and maintainability. This system offers considerable promise for protection of fixed highway obstacles.

Search terms: Energy absorption; Impact tests; Barrier design; Occupant-vehicle interface; Impact attenuators; Hazards; Impact tolerance; Impact severity; Barrier collisions

HS-006 446 Fld. 2/4

DYNAMIC TESTS OF SHORT SECTIONS OF CORRUGATED METAL BEAM GUARDRAIL

by Eric F. Nordlin; Robert N. Field; J. J. Folsom

Published in *Highway Research Record* n259 p35-50 (1969) 7 refs

Presented at the Highway Research Board, 48th Annual Meeting

Until recently, short sections of free-standing unanchored metal beam guardrail have been installed as protection from striking highway structures. Operational experience has shown that these short sections can be completely ineffective in preventing penetration at severe impact. This research developed and tested

HS-006 498 Fld. 2/4

SKID RESISTANCE STUDIES BY BUREAU OF PUBLIC ROADS

by D. W. Loutzenheiser; J. W. Hewett; E. E. Rugenstein; W. H. Carter

Bureau of Public Roads, Washington, D.C.

6 Dec 1968 33p

Prepared for presentation Committee on Design, American Assoc. of State Highway Officials, Minneapolis, Minn.

During the summers of 1967 and 1968 the Bureau of Public Roads cooperated with 17 States in a program of pavement skid testing. Objectives were (1) to evaluate the feasibility of skid tests using a rela-

2/4 Design & Construction (Cont.)

HS-006 498 (Cont.)

tively simple, inexpensive skid trailer; (2) to obtain data on the condition of pavements with respect to skid resistance. In general asphalt concrete pavements had higher skid numbers than portland cement concrete.

Search terms: Skid resistance tests; Test equipment; Pavement skidding characteristics; Concrete pavements; Asphalt pavements; Portland cements; Trailers

AVAILABILITY: Corporate author

HS-006 499 Fld. 2/4

VEHICLE IMPACT ATTENUATION BY MODULAR CRASH CUSHION

by T. J. Hirsch; Don L. Ivey

Texas A and M Univ., College Station. Texas Transportation Inst.

Jun 1969 36p

Report no. RR-146-1; Study-2-8-68-146

A pattern of single-vehicle accidents at elevated exit ramps on the Interstate Highway System pointed out the need to protect motorists from running into concrete retaining walls. The modular crash cushion is a series of 55-gallon drums placed in front of fixed objects. They are highly effective in decelerating a vehicle slowly. The results of crash tests are reported.

Search terms: Energy absorption; Single vehicle accidents; Impact attenuators; Deceleration; Impact tests; Ramps; Exits; Interstate Highway System; Texas; Retaining walls; Mathematical analysis

AVAILABILITY: Corporate author

HS-006 500 Fld. 2/4

DEVELOPMENT OF ALUMINUM BARRIER SYSTEMS

by W. B. McMullin; J. D. Howe; J. S. Lengel; R. S. Stemler; R. H. Vaterlaus
Aluminum Assoc., New York. Task Group on Median Barriers

1967 57p 8 refs

Tests on aluminum barrier systems are described. Universal "W" beam systems, bridge rail systems, and median barrier designs were tested. Median barriers include both a strong beam system with posts not strong enough to snag a car and a balanced system with strong rails and strong posts. The ability of these systems to deflect a car is discussed. All the systems recommended as a result of the tests will adequately perform the function of being effective and safe.

Search terms: Aluminum; Median barriers; Barrier design; Performance tests; Guardrails; Impact tests; Energy absorption; Bridge design; Safety design

AVAILABILITY: Corporate author

HS-006 501 Fld. 2/4

SAFETY EXPERIENCES WITH CONCRETE AND METAL BEAM BARRIERS

by David Rios Olivarez

Arizona. Highway Dept., Phoenix

Aug 1969 20p 7 refs

Presented at 1969 second western summer meeting of the Highway Research Board.

A concrete median barrier design developed by the New Jersey Highway Department and a metal beam guardrail median barrier developed by the California Division of Highways are compared for their effectiveness with respect to safety and maintenance. The study included review of documented accident reports, field observation of the median barriers, discussions with maintenance personnel and patrol officers and review of material on median barrier designs. The study was made in Phoenix. Accidents rates increased for both metal and concrete barriers. Cross-median accidents were eliminated. Maintenance experience indicated that concrete has a definite advantage over metal.

Search terms: Accident rates; Accident prevention; Median barriers; Guardrail design; Barrier design; Concretes; Maintenance; Accident reports; Field tests; Performance tests; Metals; Costs

AVAILABILITY: Corporate author

HS-006 553 Fld. 2/4; 4/5

COMPUTER PROGRAMS FOR HIGHWAY DESIGN. BRITISH INTEGRATED PROGRAM SYSTEM—PHASE II

Anonymous

Published in *Roads and Road Construction* v47 n553 p18-20 (Jan 1969)

Computer programs for various aspects of highway design are described. Among the aspects are automatic plotting, setting out programs, horizontal alignment for calculating curves, earthworks programs for interchanges and varying geological strata, digital ground model programs to extend the variable grid facility, perspective drawings, changes in cross-section profiles, drainage design.

Search terms: Computerized design; Highway design; Road curves; Digital computers; Computer programs; Highway drainage; Interchanges; Great Britain

HS-006 554 Fld. 2/4; 1/4

GROOVING TREATMENT

by Emmett Y. Stafford

Published in *Roadways* v15 n1 p7-8 (Jan-Feb 1969)

A reduction of 94.7% in accidents at a hazardous location on an interstate highway in North Carolina is credited to pavement grooving. Of 19 accidents on the same road curve, 18 took place on wet pavement. Benefit cost analysis indicates that the grooving project has more than paid for itself the first year.

Search terms: Wet road conditions; Grooving; Road curves; Interstate highway system; North Carolina; Benefit cost analysis; Accident rates; Accident prevention; Accident location

HS-006 555 Fld. 2/4

THE TRAFFIC ENGINEER'S ROLE IN ENVIRONMENTAL DESIGN

by John D. Edwards, Jr.; Donald W. Loutzenheiser; Harvey Shebesta

2/4 Design & Construction (Cont.)

HS-006-555 (Cont.)

Institute of Traffic Engineers, Washington, D.C.

Published in *Traffic Engineering* v19 n7 p26-9 (Jun 1969)

The "design concept team" approach to freeway location and design is discussed. Some factors influencing this approach are: need to locate and design freeways to be integral parts of urban design; opposition to the construction of more freeways in developed portions of urban areas; the tendency for new freeways to stimulate redevelopment; the increasing complexity of socioeconomic issues in the cities; the increasing diversity of urban programs; the increase in extremely large projects. The participation of traffic engineers in freeway planning and design is discussed.

Search terms: Freeway planning
Highway design; Urban planning
Community support; Socio-economic data; Sociological factors
Traffic engineering

HS-006 556 Fld. 2/4; 4/5

COMPUTER SIMULATION IN CONFLICTING VEHICLE STORAGE PROBLEMS

by Robert A. Jones

Published in *Traffic Engineering* v39 n5 p42-44 (Feb 1969)

If the provision of a turn storage pocket is seen as a queue sorting device in which vehicles with conflicting destinations are segregated, the technique used in design should include the effects of random distribution of turning vehicles within the approach stream and the random selection of lanes by straight-through vehicles. Computer simulation offers a comparatively simple design technique for this complex problem and allows comprehensive investigation of the effects of the improvement on traffic flow. The Monte Carlo technique is used to assign destinations to the vehicles of the arriving traffic stream.

Search terms: Turning lanes;
Monte Carlo method; Queueing theory; Turning (direction change);

Traffic lanes; Traffic flow;
Computerized simulation; Traffic simulation; Highway design; Mathematical models

HS-006 557 Fld. 2/4; 4/7

A MATHEMATICAL APPROACH TO HIGHWAY DESIGN

by Joseph Pekarsky; Justin H. Dickens

Published in *Traffic Engineering* v37 n11 p53-6 (Aug 1967) 5 refs

A method is discussed for estimating time headway mean and variance values from vehicular speed and interval spacing distributions utilizing the mathematics of expected values. The method will assure the designer of providing an adequate highway system to accommodate forecasted traffic demands.

Search terms: Headway; Speed patterns; Traffic flow patterns; Mathematical analysis; Highway design; Highway planning; Traffic estimates; Time factors

HS-006 558 Fld. 2/4; 1/3; 3/12

ROAD SURFACE CHARACTERISTICS AND ACCIDENTS

by Barbara E. Sabey

Published in *Medicine, Science, and the Law* v3 p500-11 (Oct 1962) 6 refs

Examples are given in three fields of study to illustrate how road surface characteristics play an important part in contributing to accidents: skidding resistance of roads, visibility requirements at night, and riding quality of road surfaces. Police accident reports and study at the scenes of accidents have provided a basis on which to work. Accidents can be reduced by correcting roads which have been polished and slippery and by improving street lighting. Improving the riding quality of roads gives rise to increases in the speed of traffic and may increase the accident rate. The study was made in Great Britain.

Search terms: Pavement skidding characteristics; Accident prevention; Accident causes; Visibility; Night driving; Accident reports; Accident studies; Road surfaces; Skidding accidents; Street lighting; High speed; Accident rates; Great

Britain; Wet road conditions; Skid resistance

HS-006 586 Fld. 4/8; 2/4

ARTERIAL CONGESTION CAN BE RELIEVED. PART I

by Pat Thomson

Published in *Rural & Urban Roads* v6 n12 p18-19, 22 (Dec 1968)

Some \$230 million will be spent for urban arterial construction in the next eight years within five districts of Washington State. Procedures for allocating the funds are discussed. The criteria for allocation are: population ratio of the area, vehicle miles traveled, and ratio of state highway needs within the area.

Search terms: Arterial streets; Washington; Streets; Highway costs; Highway construction; Traffic congestion; Urban areas; Urban planning; Vehicle miles; Population density; Highway planning

HS-006 587 Fld. 4/8; 2/4

URBAN ARTERIAL ACTION. PART II

Anonymous

Published in *Rural & Urban Roads* v6 n7 p34-7 (Jan 1969)

Urban roads in Washington have been classified into three functional groups, major, secondary, and collector arterials. To determine priority for improvements, five conditions were examined: structural ability to carry loads, capacity to move traffic, adequacy of alignment and geometrics, accident experience and fatalities. Congestion was considered the most important item. The methods used to calculate these factors and assign priorities for improvements are discussed.

Search terms: Traffic congestion; Arterial streets; Arterial highways; Washington; Mathematical analysis; Accident rates; Fatalities; Highway design; Highway characteristics; Streets

HS-006 613 Fld. 2/4

TRAFFIC TURBULENCE

by James Nathan Miller

2/4 Design & Construction (Cont.)

HS-006-613 (Cont.)

Published in *Traffic Safety* v66 n11
p18-20, 34-5 (Nov 1966)

It is suggested that stops, starts, changes of speed and direction cause accident-generating confusion. Since these hazards have been nearly eliminated from freeways, use of the freeway techniques could rid conventional roads of many problems. Even flow of traffic on freeways is safer than conventional roads with stop lights, too-low speed limits, signs with too much information for a driver to comprehend. Safety landscaping and breakaway posts are recommended for reducing accident rates.

Search terms: Speed patterns; Hazards; Freeways; Highway design; Highway characteristics; Traffic signals; Speed limits; Signs (displays); Breakaway bases; Accident rates; Landscape design; Traffic flow; Highway safety

HS-006 622 Fld. 3/12; 2/4

A SAFE SIGHT DISTANCE REQUIREMENT FOR UN-LANED RURAL ROADS

by W. H. Valentine

Published in *Rural and Urban Roads*
v6 n2 p34-5, 52 (Feb 1968)

The hazard of two vehicles approaching each other over blind summit curves in the same lane has not received proper attention. Many low-volume rural roads are subject to this hazard because of their vertical alignment and lack of lane control marking. Formulas for computing sight distance requirements at various speeds are given.

Search terms: Visibility; Rural highways; Traffic markings; Speed; Highway characteristics; Road curves; Hazards; Mathematical analysis; Traffic volume

HS-006 671 Fld. 2/4

INTERCHANGE DESIGN TO ELIM- INATE WRONG-WAY ENTRY

by Leon Goodman

Published in *Traffic Engineering* v40
n1 p28-31, 34-5 (Oct 1969)

The construction of extensive multi-lane divided highways has resulted in a growing number of wrong-way accidents. California studies indicate that about half the wrong-way drivers entered the freeway via an off-ramp. To prevent these accidents a layout is needed which will provide a roadway into which the errant driver can turn without encountering oncoming traffic, and which will redirect him back into the normal traffic flow. Designs for a cul-de-sac called an "ear" are given.

Search terms: Accident factors; Accident prevention; Wrong way; Interchanges; Ramps; California; Head on collisions; Freeway planning; Highway design; Driver behavior; Divided highways; Access control

HS-006 672 Fld. 2/4

ROADSIDE BOOBY TRAPS

by Harry Porter

Published in *Traffic Safety* v69 n10
p16-7, 35-6, 38-9 (Oct 1969)

Large trees encroaching on the pavement; hazardous bridge abutments and guardrails; badly designed ditches, and inadequate median strips are some of the highway hazards discussed. Early concepts of road-building are compared with the safety awareness reflected in the interstate highway system. The three federal standards of particular concern to highway engineers are briefly described. They deal with highway design, accident locations, and traffic control devices.

Search terms: Highway drainage; Hazards; Highway design; Highway safety; Interstate Highway System; Accident causes; Safety standards; Safety design; Accident location; Traffic control devices; Trees; Bridges (structures); Guardrails; Medians (dividers)

HS-006 721 Fld. 2/4; 2/9

LOW VOLUME RURAL Y JUNCTIONS

by R. T. Underwood

Published in *Australian Road
Research* v2 n8 p3-23 (Jun 1966) 7
refs

Three basic ways of treating the low volume rural Y intersection are discussed. An attempt is made to set out the conditions and range of volumes for which each type is suitable. Design features of each type are discussed. The Y junction is characterized by two traffic streams crossing at flat angles, resulting in potential collisions, many of which are almost head-on. It is a common type of intersection in rural areas.

Search terms: Accident risks; Intersections; Rural highways; Highway design; Head on collisions; Australia; Traffic volume; Traffic data analysis; Mathematical models; Traffic control

HS-006 722 Fld. 2/4

EXPERIENCE WITH ELEC- TRICALLY HEATED PAVEMENT

by J. M. Pittman

Published in *Public Works* v100 n8
p97-100 (Aug 1969)

Presented at American Society of Civil Engineers National Meeting on Structural Engineering, Louisville, Kentucky, Apr 1969.

Electrical pavement heating systems for snow and ice control are feasible but are expensive enough to require a good warrant for installation. A test in New Jersey is described. Electrical conductors embedded in the pavement were used in high traffic areas where bottlenecks develop with snow conditions. The performance characteristics of the system are described.

Search terms: Snow control; Ice control; New Jersey; Traffic volume; Traffic congestion; Icy road conditions; Performance tests; Pavement heating

HS-006 723 Fld. 2/4

DRIVEWAY ACCIDENT AND VOLUME STUDIES. PART 3. DESIGN CONSIDERATIONS

by Paul C. Box

Published in *Public Safety Systems*
v34 n5 p16-9 (Sep-Oct 1969)

Design elements for commercial driveways are discussed. One-way versus two-way traffic, land use, expected traffic volume, radius of the driveway

2/4 Design & Construction (Cont.)

HS-006-723 (Cont.)

should all be considered.

Search terms: Design standards; Driveways; One way traffic; Two way traffic; Traffic volume; Land use

HS-006 724 Fld. 2/4

THE INFLUENCE OF TOPOGRAPHY ON THE DURATION OF ICE-FORMING CONDITIONS ON A ROAD SURFACE

by M. H. Milloy; J. S. Humphreys

England. Road Research Lab., Crowthorne, Berks.

1969 24p

Report no. RRL-LR-274

Studies were made of the climatic and road surface conditions at six sites on highways in Scotland. It was found that the topographic environment most likely to favour ice-forming conditions is one in which the road is screened from the sun; the more extensive the screening, the greater the potential danger. The theoretical rate of evaporation of water varied inversely with the total duration of ice-forming conditions at each site.

Search terms: Ice prevention; Ice formation indicators; Highway design; Sunlight; Evaporation; Road surfaces; Environmental factors; Icy road conditions; Scotland

AVAILABILITY: Corporate author

HS-006 734 Fld. 2/9; 2/4

MEASUREMENT OF DIRECTIONAL FLOWS AT JUNCTIONS

by M. Peleg

Published in *Traffic Engineering & Control* v10 n6 p307-8 (Oct 1968)

In order to design a junction, including shape, dimensions, and signal pattern, the volume of traffic according to each destination must be known. Procedure for making a traffic count at a four-leg junction is described. Making a traffic count for a circle is also discussed.

Search terms: Traffic volume; Interchanges; Traffic data analysis; Traffic circles; Traffic surveys; Highway design

HS-004 404 Fld. 2/4

700,000 BRIDGES TO INSPECT--CAN WE HANDLE IT?

by John J. Hassett

Published in Rural & Urban Roads v6 n9 p42-3,46,49 (Sep 1968)

Concern for bridges has increased since the disaster at Point Pleasant Bridge on the Ohio, killing two dozen people. The responsibility for inspecting bridges is widely divided. Railroads are responsible for 192,000 bridges which are inspected at least yearly. The half million highway bridges are the responsibility of state agencies, cities, townships, county units, toll authorities. Some are rarely inspected. Lists nine elements which should be checked out for each inspection and suggests that inspections should be made by engineers.

Search terms: Bridges, Inspection, Disasters, Highway bridges, Railroad bridges, State government, Local government

HS-005 949 Fld. 2/4

RELATION BETWEEN WEAR AND PHYSICAL PROPERTIES OF ROADSTONES

by A. Kent Stiffler

Published in *HRB Special Report* n101 p56-68 (1969) 16 refs

Report no. NAS-NRC-Pub-1460; HRB-SR-101

Paper in Proceedings of the HRB Western Summer Meeting cosponsored by the Colorado Dept. of Highways, Denver, Aug 12-13, 1968.

One aspect in the skid-resistant life of a pavement is the polishing of roadstones by abrasives on the road. In this experiment ten mineral samples were held against the rubber tracks of a rotating drum in the presence of dry fine abrasives. Three loads and speeds were tested for each of three different abrasives. The significant aspect of this wear study is that hard minerals were worn with abrasives of comparative hardness.

Search terms: Wear resistance; Abrasion resistance; Skid resistance; Laboratory tests; Friction; Tire-road conditions; Mineral aggregates*; Pavement skidding characteristics; Materials tests

2/5 LIGHTING

HS-004 460 Fld. 2/5

CAPE TOWN'S MAYOR ON THE IMPORTANCE OF LIGHTS
Anonymous

Published in Robot n39
p5-6 (Aug/Sep 1968)

Discusses need for good motor vehicle lighting, especially after sunset when many drivers fail to turn lights on. Accident rate in South Africa between 6 and 8 p.m. is 2 1/2 times as high as for any other period. Includes discussion of night vision.

Search terms: Motor vehicle lighting, Night driving, Night vision, Accident causes, Republic of South Africa, Accident rates

HS-004 633 Fld. 2/5

HIGHWAY LIGHTING
by Maynard C. Sommer

18 Oct 1967 12p

Presented at the Annual Meeting of the American Association of State Highway Officials, Committee on Design, Salt Lake City, Utah

Presents general problems in lighting interchanges on controlled access highways. Provides research background for floodlighting experiments conducted by the Texas Transportation Institute including specifications for flood light assemblies.

Search terms Floodlights*, Mercury lamps*, Highway lighting, Research, Interchanges, Speeches*, Meetings

AVAILABILITY: From corporate author

HS-004 755 Fld. 2/5

LET THERE BE LIGHT
by Tommie Pinkard

Published in Texas Highways
v16 n2 p18-20 (Feb 1969)

Outlines objectives and results of the "San Antonio Illumination Study". This survey considered 3 types of lighting for freeways: high-level; median; and side-mounted. High level installations were most effective for large area interchanges.

Search terms: Illuminating, Highway lighting, Interchanges, Surveys

HS-004 934 Fld. 2/5,2/9

LIGHTING HIGHWAY SIGNS: THE USE OF MERCURY LAMPS.
PROGRESS REPORT
by Richard Mollin

Published in Illuminating Engineering v62 n2 p115-20
(Feb 1967) 6 refs

Mercury sign-lighting was compared with standard fluorescent lighting (photometrics, mechanics, and economics). The mercury system has the flexibility needed to cope with the higher signs now coming into use on highways.

Search terms: Fluorescent lamps*, Mercury lamps*, Highway signs, Lighting design, Photometry, Traffic signs, Poles (supports), Costs*

HS-005 018 Fld. 2/5

IT'S NOT ONLY HOW HIGH YOU PLACE IT....IT'S HOW YOU SPACE IT OUT
Anonymous

Published in Street and Highway Lighting v19 n1 p4-7
(First Quarter 1969)

Lighting plan uses 1000-w Type III mercury luminaires spaced at 300 foot intervals. Brighter lights reduce construction costs 38% and cut maintenance costs 28%. Public reaction seems good, no fatalities from striking light poles have occurred since 1966.

Search terms: Lighting design, Accident prevention, Poles (supports), Hazards,

Mercury lamps*

HS-005 019 Fld. 2/5,2/9

ROAD HAZARD LAMPS
by L. C. Ellaway

Published in Traffic Engineering and Control v9 n11
p553,555 (Mar 1968) 6 refs

Discusses various types of warning beacons used in road hazard markings. Includes information on design, maintenance, and costs of paraffin road contractors' lamps, battery operated, and transistorized flashing lamps. Concludes that battery operated flashing lamps would provide maximum safety and minimum of maintenance.

Search terms: Warning systems, Lighting equipment, Flashing systems, Electric batteries, Transistors*, Markers, Hazards, Night driving, Costs*, Safety devices

HS-005 103 Fld. 2/5

DISTRIBUTION OF INTENSITY FOR ROAD TRAFFIC LIGHT SIGNALS

by B. L. Cole

Published in Australian Road Research v2 n10 p13-20 (Dec 1966) 13 refs

Effective range of red signals is calculated, assuming a typical relative intensity distribution. Calculations are for signals of various peak intensities. It is concluded that a red signal with a peak intensity of 200 cd would afford a good signal under most conditions and that one of 100 cd peak intensity might be considered adequate.

Search terms: Signal color, Traffic signals, Luminance, Brightness, Visibility, Mathematical analysis*

HS-005 104 Fld. 2/5

HIGH-LEVEL LIGHTING FOR TEXAS INTERCHANGES

Anonymous

2/5 Lighting (Cont.)

HS-005-104 (Cont.)

Published in *Rural and Urban Roads* v7 n4 p44-5, 52 (Apr 1969)

The advantages of flood-lighted free-way interchanges (100 foot towers; 10,000 watt lighting) may be summed up as follows: (1) panoramic illumination permits early driving decisions; (2) light placement is farther from the roadway, fewer lights are required making the road area safer.

Search terms: High level lighting*, Highway lighting, Texas*, Flood-lights*, Interchanges, Driver performance, Towers*, Lighting design

HS-005 149 Fld. 2/5

STREET LIGHTING. ACCIDENT REDUCTION PAYS FOR LIGHTING

Anonymous

Published in *Rural and Urban Roads* v7 n4 p41-3 (Apr 1969)

Figures are given to show that installation of lighting reduces accidents and crime substantially. Costs of accidents are analyzed for several cities.

Search terms: Motor vehicle accidents; Costs*; Accident analysis; Accident prevention; Crime*; Lighting equipment; Street lighting*

HS-005 150 Fld. 2/5

MODERN STREET LIGHTING PRACTICE

by Harbans Singh

Published in *Highways and Public Works* v35 n1688 p19-21, 23 (Apr 1967)

Visibility at night is discussed in relation to the immediate background; ways are described to achieve the necessary background brightness in terms of glancing angles of light onto road surfaces. Effectiveness of different street light installations is assessed. The Code of Practice for Street Lighting in Great Britain is outlined.

Search terms: Street lighting*; Lighting design; Great Britain*; Visibility; Night driving; Night vision; Brightness; Design standards

HS-005 151 Fld. 2/5

DARK HOURS CAN BE MADE SAFER FOR THE MOTORIST

by J. Parker Heck

Published in *American Road Builder* v44 n6 p23-5 (Jun 1967)

Poor visibility is the prime factor in the higher fatality rate at night. Better street and highway lighting are effective in reducing night accidents. Ten critical areas particularly needing good lighting are discussed.

Search terms: Accident prevention; Night driving; Fatalities; Accident location; Visibility; Night vision; Street lighting*; Highway lighting*; Accident rates; Costs*

HS-005 152 Fld. 2/5

LIGHTED CROSSINGS ARE SAFE

by Douglas J. Carmody

Published in *Rural and Urban Roads* v4 n9 p90-1 (Sep 1966)

Decisive accident reduction has been achieved in Modesto, California, by illuminating otherwise unprotected railroad crossings, where most auto-train collisions took place at night. A crossing can be illuminated for \$800, far less than the cost of flashing lights.

Search terms: Railroad grade crossings*; Accident prevention; Illuminating; California*; Collisions (accidents); Costs*; Warning systems; Night driving; Automobile accidents

HS-005 211 Fld. 2/5

A PRELIMINARY EXAMINATION OF THE OPTICAL PERFORMANCE OF ROAD TRAFFIC SIGNAL LIGHTS

by B. L. Cole; B. Brown

Published in *Australian Road Research* v2 n8 p24-32 (Jun 1966)

Report of investigation to determine whether red road traffic signal intensity requirement of 200 candelas could be met without radical change of optical design of the signals. By judicious choice of reflector, lamps and refractor, and by careful focusing it is shown that an on-axis intensity of over 400 candelas can be achieved

while still retaining an adequate distribution of light.

Search terms: Signal lights; Signal color; Traffic signals; Luminance; Reflectors; Refraction*

HS-005 212 Fld. 2/5

A NOTE ON THE EFFECTIVENESS OF SURROUND SCREENS FOR ROAD TRAFFIC SIGNAL LIGHTS

by B. L. Cole; B. Brown

Published in *Australian Road Research* v2 n10 p21-3 (Dec 1966)

Discusses method of improving signal visibility when the signal is seen against a very bright background. Since surround screens are also used to enhance the target value of an installation, the possible consequences of painting the screens a light color are also covered.

Search terms: Signal lights; Surround Screens*; Signal color; Visibility; Traffic signals; Luminance; Reflecting surfaces

HS-005 210 Fld. 2/5

INFLUENCES ON CURRENT AND FUTURE STREET LIGHTING PRACTICE

by A. Wilcock

Published in *Traffic Engineering and Control* v9 n11 p548-9 (Mar 1968)

Describes a British program for trunk road lighting. Priority will be determined by estimating the financial saving due to the reduction in night-time accidents. Standards for road and street lighting are outlined.

Search terms: Lighting equipment; Highway lighting; Lighting design; Great Britain*; Standards; Streets; Accident prevention; Costs*

HS-005 284 Fld. 3/12; 2/5

THE EFFECT OF GLARE FROM STREET LIGHTING LANTERNS ON THE VISIBILITY OF OBJECTS FOR DRIVERS OF DIFFERENT AGES

by A. W. Christie; A. J. Fisher

Published in *Australian Road Research Board Proceedings of the Third Conference, Sydney* v3 pt1 p570-88 (1966) 31 refs

2/5 Lighting (Cont.)

HS-005-284 (Cont.)

Report no. Paper-297

Disability glare in lighted streets is important and should not be neglected when calculating revealing power. The equivalent veiling luminance is markedly dependent on the age of the observer. More precise knowledge is needed about the way the equivalent veiling luminance varies with changes in the position of the glare source in relation to the observer's point of regard over the range of conditions important in the street lighting problem. Results of three experiments with 122 subjects are reported.

Search terms: Visibility; Vision*; Glare; Age factors; Luminance; Street lighting*;

HS-005 332 Fld. 2/5

A STUDY OF A LOW-LEVEL LIGHTING SYSTEM PREPARED FOR THE MILWAUKEE COUNTY EXPRESSWAY AND TRANSPORTATION COMMISSION. EXCERPTS

by Charles J. Mitch

Howard, Needles, Tammen and Bergendoff, Milwaukee, Wis.

29 Dec 1966 6p

Compares normal overhead pole lighting 30 feet above roadway with low rail-mounted fluorescent units centered 40 inches above roadway. Discusses mechanics of highway illumination, the design criteria for a low level system, and its advantages and disadvantages. Concludes that it would provide improved safety, higher illumination, better appearance, greater user comfort; but would cost more to install, maintain, and operate.

Search terms: Lighting design; Lighting equipment; Highway lighting; Highway costs; Low level lighting*

AVAILABILITY: Corporate author

HS-005 333 Fld. 2/5

A CRITICAL REVIEW OF THE VALUE OF ROAD LIGHTING

by K. L. Duncan

Published in *Traffic Engineering and Control* v8 n8 p519,521,523 (Dec 1966)

Three main objectives of this paper are: (1) to question the relevance to present day conditions of the basic 1937 lighting classifications used in Great Britain; (2) to suggest revised classifications; (3) to emphasize the need for more information about the effect of lighting.

Search terms: Highway lighting; Lighting design; Rural areas; Urban areas; Night driving; Great Britain*; Design standards

HS-005 334 Fld. 2/5

PROGRESS IN STREET LIGHTING

by Granville Berry

Published in *Traffic Engineering and Control* v9 n1 p59-60 (May 1967)

Street lighting should become an important element of the work of the traffic engineer. This article examines: recent legislation, intersection lighting, new types of lights, tunnel lighting, highway lighting.

Search terms: Highway lighting; Intersections; Tunnels; Illuminating; Great Britain*; Lighting design; Design standards

HS-005 394 Fld. 2/5

PROGRESS REPORT ON HIGH MAST LIGHTING

by K. L. Duncan

Published in *Traffic Engineering and Control* v8 n9 p566-9 (Jan 1967)

Review is presented of design features, costs, and applications of various high mast lighting installations in Great Britain. Such installations are being installed at junctions and circles.

Search terms: Poles (supports); Lighting design; Highway lighting; Costs*; Great Britain; High level lighting; Intersections; Crossings; Traffic circles

HS-005 428 Fld. 2/5

THE ACHIEVEMENT OF QUALITY IN STREET LIGHTING

by C. C. Smith

Published in *Illuminating Engineering Society. Transactions (London)* v32 n2 p136-48 (1967)

Requirements for quality street lighting are based on the average luminance of the road surface, degree of glare caused by the light sources, and degree of non-uniformity of the lighting pattern. Methods for achieving these requirements are discussed. The aesthetics of lighting is outlined in relation to traffic routes, residential roads, and city centers.

Search terms: Great Britain*; Lighting equipment; Luminance; Lighting design; Visibility; Glare; Central business districts; Street lighting*; Road surfaces; High level lighting*; Design standards

HS-005 441 Fld. 3/12; 2/5

GLARE AS A CRITERION FOR QUALITY IN STREET LIGHTING

by J. B. de Boer; D. A. Schreuder

Published in *Illuminating Engineering Society. Transactions (London)* v32 n2 p117-35 (1967)

A simple method is given for determining the degree of discomfort glare in street lighting installations. Results arrived at by this method are compared with the glare produced in existing installations. Comparison is also made with the rules laid down in the recommendations for public lighting in Great Britain. It is suggested that standards for the limitation of glare, for use in street lighting codes, can be determined on the basis of this method.

Search terms: Great Britain*; Glare; Luminance; Lighting equipment; Design standards; Street lighting*; Regression analysis*

HS-005 627 Fld. 2/5

LIGHTING PRACTICE IN SOUTHERN AFRICA. BETTER LAMPS INVOLVEMENT-ANGLES, EFFECTIVENESS, INTENSITIES

2/5 Lighting (Cont.)

HS-005-627 (Cont.)

by J. T. Grundy; A. H. S. van Wyngaard

Published in *Traffic Engineering and Control* v10 n10 p526-7, 533 (Feb 1969) 5 refs

The influence of African environmental conditions for exterior lighting are discussed, especially for the Republic of South Africa and Rhodesia. Lighting practices for urban highways and streets, pedestrian preferences in lighting, and lighting for town and civic centers are outlined.

Search terms: Africa*; Highway lighting; Pedestrians; Republic of South Africa*; Southern Rhodesia*; Environmental factors; Street lighting.

HS-005 673 Fld. 2/5; 1/3

A STUDY OF THE BENEFITS OF SUBURBAN HIGHWAY LIGHTING

Tennessee Valley Authority, Chattanooga

Published in *Illuminating Engineering* v64 n4 p359-63 (Apr 1969 Sec. 2)

This study was made to determine the effectiveness of highway lighting in reducing automobile accidents. Figures are given for accidents, injuries, and deaths during the year prior to the installation of lighting and for the two-year period after lighting was installed. After the installation of highway lighting, accidents were reduced 22 per cent and injuries were reduced 39 per cent per million vehicular miles. A discussion of costs is included.

Search terms: Suburban areas; Highway lighting; Fatalities; Injuries; Tennessee*; Traffic flow; Accident prevention; Costs*; Vehicle miles*; Accident data; Accident rates; Night driving

HS-005 708 Fld. 4/7; 2/5; 5/10

SCALES OF LUMINANCE AND APPARENT BRIGHTNESS

by P. A. Jay

Published in *Light and Lighting* v60 p42-5 (Feb 1967) 6 refs

Lighting designers need a simple way to indicate the brightness of different surfaces. A logarithmic scale of luminance, while not accurately representing the human perception of brightness, would be convenient. The principle could be extended to specify the visual field by employing a logarithmic scale of illumination which could be combined with a reflectance scale to provide a dual-scale system of specifying surface brightness.

Search terms: Visual perception; Luminance; Brightness; Logarithms; Illuminating; Lighting design; Visibility

HS-005 738 Fld. 2/5

HIGHWAY LIGHTING IN PERSPECTIVE

by A. W. Christie

Published in *Highways and Public Works* v37 n1711 p26-30, 33-8 (Mar 1969) 6 refs

Standards of lighting for main streets and highways are outlined. The general level of lighting, uniformity within installations, limitations on glare, and visual guidance are considered. The effect of surface color and the use of luminance instead of illumination are discussed. The application of lighting standards in the U.S.A., Great Britain, Australia, and Japan is outlined.

Search terms: Design standards; Street lighting*; Highway lighting; Lighting equipment; Lighting design; Luminance; Illuminating; Great Britain*; Australia*; Japan*; Glare; Color; Visibility; United States*

HS-005 739 Fld. 2/5; 3/4

FREEWAY ILLUMINATION AND DRIVING PERFORMANCE

by Glenn F. Lindsay; Thomas H. Rockwell

Published in *Traffic Engineering* v39 n6 p36-42 (Mar 1969)

A series of tests on the Connecticut Turnpike studied performance under illumination levels of 0.22 and 0.62 foot candles. Speeds were slightly greater and gas pedal activity increased under brighter lighting, but

steering seemed unaffected. Roadway geometry had a greater effect on driver control than did illumination, probably because headlights washed out the small fixed lighting levels changes. It is not yet possible to ascertain the practical implication of the findings.

Search terms: Night driving; Motor vehicle handling; Driver performance; Highway lighting; Speed patterns; Steering (driving); Headlights; Highway characteristics; Driver behavior; Connecticut*; Accelerator pedals*; Road tests

HS-005 740 Fld. 2/5; 3/11

PEDESTRIANS SHOULD BE SEEN

Anonymous

Published in *Public Safety System* v34 n2 p19 (Mar-Apr 1969)

Pedestrians should be seen and not hurt. For maximum benefit and effectiveness, general guidelines are presented for installation of a cross-walk lighting system.

Search terms: Crosswalks; Crossing illumination; Lighting design; Pedestrian safety; Accident prevention; Street lighting

HS-005 741 Fld. 2/5; 3/12

VISIBILITY, ACCIDENTS AND THE S. A. A. STREET LIGHTING CODE

by A. Fisher

Published in *Australian Road Research* v3 n4 p3-26 (Dec 1967) 34 refs

The Standards Association of Australia requires a light level which should give adequate visibility and ensure the potential reduction in accidents possible in urban traffic. However, it might be warranted to use a higher light level in certain environments such as roads with high usage which may have more accidents, roads with dark environments where visibility of pedestrians is poor, and environments which are dirty or where installations deteriorate.

Search terms: Australia*; Street lighting*; Visibility; Accident prevention; Urban areas; Pedestrian safety; Lighting design; Design standards; Lighting equipment; Glare; Comfort; Mathematical

2/5 Lighting (Cont.)

HS-005-741 (Cont.)

analysis*; Traffic volume;
Luminance

HS-005 829 Fld. 2/5

HIGH LEVEL LIGHTING

by Richard C. Kay

Published in *Highway Focus* v1 n1
p5-10 (Jun 1969)

Describes a lighting system on a cloverleaf interchange located on an interstate highway in Washington. The system uses 23 poles 103 feet high, each with three 1,000 watt luminaires. A pseudo-daylight effect is created. This installation is the first of its kind in the United States.

Search terms: High level lighting*; Highway lighting; Cloverleaf ramps; Interchanges; Washington*; Poles (supports); Visibility; Brightness; Glare; Interstate highway system

HS-006 107 Fld. 2/5

IES APPROVED METHOD FOR PHOTOMETRIC TESTING OF ROADWAY LUMINAIRES USING INCANDESCENT FILAMENT, OR MERCURY OR SODIUM ELECTRIC DISCHARGE LAMPS

Illuminating Engineering Society,
New York

Published in *Illuminating Engineering*
v63 n10 p541-52 (Oct 1968) 21 refs

Test procedures and methods of reporting data are provided to promote the uniform evaluation of the optical performance of roadway luminaires.

Search terms: Highway lighting; Lighting equipment; Test equipment; Luminance; Brightness; Visibility; Photometry; Lamps; Mercury lamps*; Incandescent lamps*; Sodium lamps*

HS-006 502 Fld. 2/5

MOTORWAY LIGHTING

by Umberto Dagnino

Published in *Traffic Engineering and Control* v11 n2 p89-91 (Jun 1969)

The basic criteria for a quality

lighting system are: mean level of illumination, uniformity of illumination, limitation of glare, and driving vision. Characteristics of a system meeting these criteria are outlined.

Search terms: Highway lighting; Lighting design; Illuminating; Glare; Visibility

HS-006 597 Fld. 5/10; 2/5; 2/1

SOME NEW RESEARCH ON TWO PROBLEMS CONNECTED WITH PUBLIC LIGHTING

by A. W. Christie

Published in *Public Lighting* v33
n143 p174-87 (Dec 1968) 20 refs

While street lighting reduces night accidents, this benefit may be modified by other factors, two of which are discussed. Part 1 of this paper deals with vehicle front lights for use in lighted streets. Methods of modifying headlights and sidelights to make them more suitable for driving in well-lit streets are evaluated. Dipped headlight campaigns are also discussed. Part 2 discusses lighting columns as collision hazards. It is estimated that 7% of British motor vehicle accident fatalities result from collisions with lighting columns. The development of breakaway columns and the types of road on which they should be used are discussed.

Search terms: Dimmed headlights; Fatalities; Great Britain; Accident prevention; Night driving; Street lighting; Headlights; Side lights; Lighting design; Collisions (accidents); Breakaway bases; Poles (supports); Safety campaigns; Hazards

HS-006 673 Fld. 2/5

DISTINCTIVE LIGHTING FOR AN URBAN TOLLWAY

by Donald E. Harper

Published in *Public Works* v100 n11
p82-3 (Nov 1969)

Lighting for a new highway in Dallas, Texas, is described. High pressure sodium lamps were chosen. Glare shields were installed on those in residential areas. Costs and efficiency of the lights are discussed.

Search terms: Highway lighting; Glare; Costs; Sodium lamps; Dallas

HS-006 674 Fld. 2/5; 3/12

VISIBILITY AS CRITERION OF THE ESTIMATION OF STREET LIGHTING INSTALLATIONS

by M. A. Ostrovsky

Published in *Public Lighting* v33
n143 p191-7 (Dec 1968) 16 refs

The code for street lighting used in the USSR is discussed. For comparative estimation of the different types of luminaires and the ways of their arrangement, visibility is recommended as the criterion. The visibility of objects with different reflection factors should be studied and the influence of non-uniformity of luminance distribution on visual performance under street lighting conditions should be defined.

Search terms: Mathematical models; USSR; Street lighting; Visibility; Luminance; Reflectance; Lighting design; Lighting equipment

HS-006 675 Fld. 2/5

ROADWAY LIGHTING PRACTICE IN THE U.S.A.

by W. H. Edman

Published in *Public Lighting* v33
n143 p212-19, 232-3 (Dec 1968) 7 refs

The history of road lighting is outlined. Early codes and practices, the federal aid program of the interstate highways and urban expressways, the costs of lighting, and future trends are discussed. Many new light sources and new luminaire designs promise more effective control of light distribution and glare.

Search terms: Highway lighting; Lighting design; Lighting equipment; Costs; Urban highways; Federal aid; Interstate highway system; Glare; History; United States

HS-006 725 Fld. 2/5

THE LIGHTING OF URBAN THROUGH-ROUTES AND COMPLEX JUNCTIONS

by E. M. Jordan; G. Mainwaring;
M. H. Mounsdon

Published in *Public Lighting* v30
n128 p17-26 (Mar 1965)

Installations in which there is a high level of flux are usually successful. High levels of illumination are

2/5 Lighting (Cont.)

HS-006-725 (Cont.)

generally expected by road users and are justified by increased amenity value, safety, and better traffic flow. The introduction of new techniques, such as lighting from high masts and the possible introduction of new light sources in the next few years, open up new possibilities to lighting engineers. Various lighting installations in Great Britain are described.

Search terms: Lighting design; Urban areas; Interchanges; Lighting equipment; High level lighting; Great Britain; Traffic flow; Highway lighting; Flux density; Illuminating

HS-006 726 Fld. 2/5

THE IMPACT OF NEW LIGHT SOURCES ON MOTORWAY AND STREET LIGHTING

by E. J. G. Beeson; P. D. Gunnell

Published in *Public Lighting* v33 n143 p198-211 (Dec 1968) 5 refs

Light sources meeting the requirements of the British code of street lighting practice are discussed. Mercury and sodium lamps are being intensively developed to give greater reliability and better maintained performance through longer service lives. Equipment used for lighting traffic routes, city centers, and motorways is discussed.

Search terms: Lighting equipment; Great Britain; Street lighting; Sodium lamps; Mercury lamps; Service life; Central business districts; Highway lighting; Lighting design

HS-006 727 Fld. 2/5

STREET LIGHTING—BACK AND BETTER

by N. L. Staniforth

Published in *Public Lighting* v33 n143 p220-33 (Dec 1968)

Describes experience in London on street lighting installations where the siting of columns at the back of the path was a feature of installation design. Illumination values are higher than those generally provided. Present

standards of lighting are considered inadequate for major traffic routes, and the higher standard described will provide greater visual comfort and safety potential and may well pay for itself in reduced accident costs. On minor roads with housing development of average density, sodium lights are adequate.

Search terms: Street lighting; Lighting design; Lighting equipment; London; Visibility; Accident rates; Sodium lamps; Illuminating; Costs; Design standards

HS-004 633 Fld. 2/5

HIGHWAY LIGHTING

by Maynard C. Sommer

18 Oct 1967 12p

Presented at the Annual Meeting of the American Association of State Highway Officials, Committee on Design, Salt Lake City, Utah

Presents general problems in lighting interchanges on controlled access highways. Provides research background for floodlighting experiments conducted by the Texas Transportation Institute including specifications for flood light assemblies.

Search terms Floodlights*, Mercury lamps*, Highway lighting, Research, Interchanges, Speeches*, Meetings

AVAILABILITY: From corporate author

2/6 MAINTENANCE

HS-005 268 Fld. 2/6

RESTORING SALT-DAMAGED HIGHWAY BRIDGES

by Robert J. Walsh

Published in *Civil Engineering-ASCE* v37 n5 p57-9 (May 1967)

On the New York Thruway, to provide freeze-thaw protection for bridges, boiled linseed oil and mineral spirits are sprayed. Other materials used for protection, including asphalts and fiberglass, are described.

Search terms: Damage; Highway maintenance; Bridges (structures); Concrete pavements; Linseed oil*; Petroleum spirits*; Asphalts*; Bridge surfaces; Sodium chloride*; New York*; Icy road conditions; Materials tests; Fiber glass*

HS-005 105 Fld. 2/6

THE REPAIR OF SPALLED CONCRETE SURFACES WITH THIN CONCRETE PATCHES: AN EXPERIMENT ON TRUNK ROAD A.34 AT STAFFORD

by G. E. Higgins, C. H. Peters

England. Road Research Lab., Crowthorne, Berks.

1968 20p

Report no. RRL-LR-217; PB-182 827

Extensive areas of concrete and cement-mortar patches were laid in 1959 on a heavily trafficked trunk road. The condition of the patches under heavy traffic is still excellent and indicates that thin concrete patches provide an effective method of repairing spalled concrete surfaces.

Search terms: Highway maintenance, Repair*, Concrete pavements, Cements*, Highway surfaces, Traffic volume, Great Britain*

AVAILABILITY: CFSTI as PB-182 827

HS-005 268 Fld. 2/6

RESTORING SALT-DAMAGED HIGHWAY BRIDGES

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Search terms: Damage; Highway maintenance; Bridges (structures); Concrete pavements; Linseed oil*; Petroleum spirits*; Asphalts*; Bridge surfaces; Sodium chloride*; New York*; Icy road conditions; Materials tests; Fiber glass*

HS-005 335 Fld. 2/6; 2/7

CORROSION INHIBITORS AS ADDITIVES TO HIGHWAY DE-ICING SALTS-LABORATORY TESTS

by R. R. Bishop; D. E. Steed

England. Road Research Lab., Crowthorne, Berks.

Published in *Institution of Mechanical Engineers Proceedings* v182 pt3J p1-6 (1968) 8p

Paper 1, presented at *Corrosion and its Prevention in Motor Vehicles* [Symposium] London, England, 28-29 Mar 1968.

Nearly a million tons of rock salt are used on roads in Great Britain during severe winters, and this causes some corrosion damage to motor vehicles. A 3% rock salt solution is 13 times more corrosive than rainwater to steel. Polyphosphate and chromate inhibitors were tested and found ineffective as corrosion inhibitors to bare steel, but polyphosphate was less corrosive to painted panels.

Search terms: Inhibitors; Ice removal; Laboratory tests; Corrosion prevention; Corrosion tests; Paints; Steels; Chromates*; Phosphates*; Rock salt*; Great Britain*

HS-005 369 Fld. 5/11; 2/6

CORROSION OF MOTOR VEHICLES BY DE-ICING SALT-RESULTS OF A SURVEY

by R. R. Bishop

England. Road Research Lab., Crowthorne, Berks.

1968 16p 5 refs

Report no. RRL-LR-232

Surveys of the extent of corrosion of motor vehicles in two British counties present an estimate of the damage to vehicle and trim. Silencer and exhaust replacements are carried out at least twice as frequently in the county which uses 7 tons of de-icing salt annually. Trials to establish the effectiveness of a corrosion inhibitor are proposed.

Search terms: Corrosion; Snow removal; Ice removal; Great Britain*; Questionnaires*; Silencers*; Exhaust systems; Corrosion prevention; Ornaments; Sodium chloride*; Motor vehicle maintenance

AVAILABILITY: CFSTI

HS-005 395 Fld. 2/6

BRIDGE SAFETY: SOUTH CAROLINA'S PROGRAM MEASURED BY MAINTENANCE

by John P. Ward, Jr.

Published in *Dixie Contractor* p28-3 (19 Apr 1968)

South Carolina's approach to highway safety includes bridge inspection and maintenance. A special hydraulic crane permits safer more efficient inspection of a high bridge over water. Streambed soundings for foundations on wood pilings under water are made regularly. South Carolina plans ahead, sees potential changes, and plans remedial action.

Search terms: Highway maintenance; Bridges (structures); Inspection; South Carolina*; Hydraulic equipment; Highway bridges*; Highway safety

HS-005 628 Fld. 2/6

CRITERIA FOR MAINTENANCE OF MULTILANE HIGHWAYS

Anonymous

2/6 Maintenance (Cont.)

HS-005-628 (Cont.)

Published in *Journal of the Highway Division, Proceedings of the American Society of Civil Engineers* v94 nHW1 p43-60 (Jun 1968)

Statement of Policy by the Committee on Construction, Maintenance and Operation of Highways

Proposes standards or levels of maintenance for various classifications of multilane highways, but is not intended as a handbook of procedures. Interrelationships among the need for protecting the highway structure, the need to make optimum use of the available facility, the need to provide safe, convenient, and enjoyable service to the user, and the need to make the highway a compatible part of the environment all have to be weighed against highway funds, and standards adopted that fulfill these needs as effectively as funds permit.

Search terms: Highway standards; Highway maintenance; Preventive maintenance; Corrective maintenance; Highway costs; Highway characteristics; Highway safety; Highway usage; Environmental factors

HS-006 162 Fld. 1/3; 2/6

FATAL ACCIDENT PROBERS REPORT FINDINGS

Anonymous

Published in *Chicago Traffic Safety Review* p1-3 (Nov-Dec 1963)

A Committee for Fatal Traffic Accident Investigation reported to the mayor of Chicago its investigations of 261 fatal accidents. It found that accident causes could not be clearly established, were never due to physical conditions at the scene, and apparently resulted from driver or pedestrian error. Some recommendations for improvements to roads were made, but in more than half the accidents no corrections at the site were needed.

Search terms: Fatalities; Accident investigation; Chicago*; Freeways; Accident location; Accident causes; Highway maintenance; Pedestrian accidents; Streets

HS-006 169 Fld. 1/4; 2/6

STATES PINPOINT DEATH TRAPS

Anonymous

Published in *Traffic Safety* v64 n11 p16-17, 39 (Nov 1964)

State highway departments cooperated with the Bureau of Public Roads in a concerted drive to eliminate the most dangerous highway death traps. Some state spot improvement programs are briefly described from a survey undertaken by the American Road Builders Association.

Search terms: Highway safety; Accident prevention; Federal aid; Financing; State government; Hazards; Accident location; Highway maintenance

HS-006 224 Fld. 2/6

QUALITY STANDARDS FOR HIGHWAY MAINTENANCE

by Donald R. Anderson

Washington Dept. of Highways, Olympia

May 1968 82p

This manual for the preservation and upkeep of highways includes the roadway, shoulders and road approaches, the roadside, drainage, structures, snow and ice removal, and traffic services.

Search terms: Highway maintenance; Snow removal; Ice removal; Road repair; Washington; Corrective maintenance; Traffic control; Road shoulders; Highway drainage; Highway surfaces

AVAILABILITY: Corporate author

HS-006 330 Fld. 1/4; 2/6

CALIFORNIA'S TRAFFIC SAFETY PROGRAM

by R. J. Israel

Published in *Traffic Engineering* v37 n9 p21-7 (Jun 1967)

Improvements to accident location sites on the streets and highways in California are discussed. Mileposts have been installed so that accidents can be located more precisely. A data processing system has been established to pinpoint the locations

needing improvement most. Includes discussion of costs.

Search terms: California; Safety programs; Accident prevention; Accident location; Data processing; Accident records; Highway maintenance; Highway costs

HS-006 224 Fld. 2/6

QUALITY STANDARDS FOR HIGHWAY MAINTENANCE

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AVAILABILITY: Corporate author

2/7 METEOROLOGICAL CONDITIONS

HS-004 632 Fld. 2/4,2/9,2/7

STUDY OF ELECTRICALLY HEATED BRIDGE DECKS FOR ICE PREVENTION

by H. D. Butler
Texas. Highway Dept.,
Austin

Mar 1968 80p
Contract 1-5-63-72
Report no. RR-72-1-F

Reports the design, construction, and study of 3 electrical heating systems to prevent ice and snow formation on bridges. Systems were found to be feasible and economical. Additional research is required to study the relationship between slab thickness and heat distribution.

Search terms: Bridge decks*, Bridge design, Ice prevention*, Ice removal, Electric heating*, Snow removal, Concrete pavements, Texas*, Cost data

AVAILABILITY: From
corporate author

HS-004 812 Fld. 2/7

RESUME OF TESTS ON COMMERCIAL VEHICLES ON WINTER SURFACES, 1939-1966

by Gyaneshwar Prased Hajela
National Safety Council,
Madison, Wis. Committee on
Winter Driving Hazards and
Wisconsin Univ., Madison.
Dept. of Mechanical Engineering

1968 194p
M. S. Thesis

Summarizes testing done by the Committee on Winter Driving Hazards, especially on braking, cornering, driver technique, stability, and traction. In braking tests the effects of load, number of braked wheels, ambient conditions, pavement conditions, types of tire treads and chains, and techniques of brake application are investigated, and emergency braking systems tested. Cornering tests investigated load,

tire treads, location of fifth wheel coupler, braking techniques, and braking with and without front wheel brakes. Driver technique tested recovery from jackknifing. Stability tests investigated various causes of instability, and traction tests measured acceleration performance and drawbar pull. Emergency tire chains for trucks and fifth wheel couplers for tractor-trailers were also tested.

Search terms: Driver skills, Loading tests, Winter*, Performance tests, Braking techniques, Cornering, Traction, Trucks, Vehicle stability, Acceleration(physics), Braking distance, Tire chains, Truck brakes, Tractor-trailers*, Emergency brakes, Wheels, Tire treads, Pavement skidding characteristics, Driving conditions, Road surfaces, Dry road conditions, Jack knifing*, Icy road conditions, Wet road conditions, Sanding*, Snow tires, Studded tires,

AVAILABILITY: From National
Safety Council \$15.00

HS004 813 Fld. 2/7

RESUME OF TESTS ON PASSENGER CARS ON WINTER SURFACES, 1939-1966

by Gyaneshwar Prased Hajela
National Safety Council,
Madison, Wis. Committee on
Winter Driving Hazards and
Wisconsin Univ., Madison.
Dept. of Mechanical Engineering

1968 168p

Summarizes testing done by the Committee on Winter Driving Hazards, especially on braking, cornering, and traction. In all tests the effect of braking techniques, sanders, air pressure in tires, weight distribution, tire size, size and weight of car, and ambient conditions on braking distance is investigated, and effectiveness of various tire and chain designs evaluated. Cornering ability was determined by circle cornering test,

passing maneuver tests, and restrained cornering tests. Tractive ability was evaluated by acceleration performance, grade-ability, drawbar pull at various speeds, and percentage of slips. Anti-skid devices were also evaluated.

Search terms: Studded tires, Snow tires, Winter*, Tire treads, Braking techniques, Driving conditions, Cornering, Traction, Tire chains, Tire design, Passing (driving), Pavement skidding characteristics, Acceleration (physics), Vehicle size, Vehicle weight, Braking distance, Antiskidding devices, Tire size, Inflation pressure, Gradients, Road surfaces, Passenger cars, Icy road conditions, Dry road conditions, Wet road conditions, Sanding*

AVAILABILITY: From
corporate author \$15.00

HS-004 845 Fld. 5/10,2/7

SAFE DRIVING IN FOG by J. B. Davey

Published in Ophthalmic Optician v6 p59-61
(22 Jan 1966)

Describes problems of driving in fog on British highways, where a number of multiple crashes have taken place. Warning signs with fog lamps have been installed and an advisory speed of 30 mph is used in fog. Defensive driving and fog lamps on the rear of cars are advised.

Search terms: Speed, Fog, Visibility, Driving conditions, Great Britain*, Rear end collisions, Rear lights*, Warning systems, Driver behavior, Defensive driving*, Fog lamps*

HS-004 855 Fld. 5/22,2/7

HOLD ON! WINTER TYRES, STUDS AND CHAINS by Michael Bowler

Published in Motor (London)
v134 n3465 p45-6 (16 Nov 1968)

2/7 Meteorological Conditions (Cont.)

HS-004-855 (Cont.)

Discusses winter driving conditions in Great Britain and the use of studded tires and chains on wet and icy roads. Under British conditions the roads are more often wet than icy.

Search terms: Tires, Tire chains, Studded tires, Icy road conditions, Winter*, Wet road conditions, Radial ply tires, Braking distance

HS-004 870 Fld. 2/7, 2/9

THE AUTOMATIC ICE DETECTOR
Anonymous

Published in Highway User
p24-5 (Feb 1969)

The Michigan Highway Department has developed a system which electronically warns motorists of icy bridge conditions. Detector consists of a humidity sensor and an ambient temperature sensor mounted on bridge railing and deck sensors. Warning signs are turned on automatically.

Search terms: Ice formation indicators*, Icy road conditions, Temperature, Bridge surfaces, Electronic devices, Warning systems, Humidity*, Signs (displays)

HS-004 906 Fld. 5/6, 2/7

THE EFFECTS OF AIR POLLUTION
National Center for Air Pollution Control,
Washington, D. C.

1967 22p
Report no. PHS-Pub-1556
1967 revision.

Complexities of the air pollution problem are reviewed: physiological effects on humans (respiratory diseases, malignant tumors); pollutants generated: carbon monoxide (from automobile exhaust emissions), oxides, oxidants, hydrocarbons; and finally the

economic loss of \$12 billion per year to the nation.

Search terms: Diseases, Air pollution, Contaminants*, Carbon monoxide, Exhaust emissions

AVAILABILITY: From GPO,
\$0.45

HS-004 935 Fld. 2/7

CARBON MONOXIDE IN THE ATMOSPHERE
by R. C. Robbins,
K. M. Borg, E. Robinson

Published in Journal of the Air Pollution Control Association v18 n2 p106-10
(Feb 1968) 10 refs

Describes a carbon monoxide analyzer which is capable of continuous measurement of the concentration in the atmosphere. It operates through reaction of hot mercuric oxide followed by photometric determination of mercury vapor produced and is useful in both laboratory and field tests.

Search terms: Air pollution, Carbon monoxide, Measuring instruments, Chemical analysis, Hydrocarbons*, Olefins*

HS-004 936 Fld. 2/7

FOG ABATEMENT PROJECT.
PROGRESS REPORT, SEPTEMBER 1966-OCTOBER 1967
by Frederick H. Scheer,
Arthur C. Johnson
New Jersey. Dept. of Transportation, Trenton

Nov 1967 36p
Report no. 68-007-7767
Includes Progress Rept. on Fog Removal Experiments, dtd. 9/16/66, and A Rept. on Pilot Operation of the Fog Screen, dtd. 4/15/65.

Describes an experimental outdoor fog broom installation, procedures for evaluating the materials used, and the use of demonstration chambers for fog abatement. The fog brooms are meant for highway use and are turned on automatically. Many technical problems were

encountered in testing them, and their effectiveness is limited.

Search terms: Visibility, Highway safety, Fog, Fog dispersal*, Field tests, Laboratory tests

AVAILABILITY: From corporate author

HS-005 088 Fld. 5/6, 2/7

MANY POSSIBILITIES EXIST FOR ELIMINATING MAJOR POLLUTANTS FROM EXHAUST GAS

by P. S. Myers, O. A. Uyehara

Published in *SAE Journal* v77 n3
p34-6 (Mar 1969) 5 refs

Adding an inert gas, using a lean mixture, or a rich mixture might eliminate major pollutants from exhaust gas. The basic approach is to increase the rate of exhaust gas destruction in the exhaust either by increasing the amount of oxygen present or by maintaining the exhaust at high temperatures by use of insulated manifolds.

Search terms: Exhaust emission control, Nitrogen oxides*, Carbon monoxide, Hydrocarbons, Manifolds*, Fuels, Circulation*, Air injection*

HS-005 135 Fld. 5/22, 2/4, 2/7

SKIDDING ACCIDENTS ON RUNWAYS AND HIGHWAYS CAN BE REDUCED

by Walter B. Horne

Published in *Astronautics and Aeronautics* v5 n8 p48-55 (Aug 1967) 7 refs

Points out several tire, pavement, and vehicle-operating conditions that degrade both aircraft and ground vehicle safety: smooth and worn tires, smooth textured pavement. An educational program which highlights operational hazards and vehicle limitations for substantial reduction of skidding accidents and antiskid devices is recommended.

Search terms: Skidding, Runways, Aircraft, Surface properties, Wet skidding, Tire treads, Pavements, Grooving*, Pavement skidding characteristics

2/7 Meteorological Conditions (Cont.)

HS-005 153 Fld. 2/7

THE DEPTH OF RAIN WATER ON ROAD SURFACES

by N. F. Ross; K. Russam

England Road Research Lab.,
Crowthorne, Berks.

1968 30 p 10 refs
Report no. RRL-LR-236

The depth of water resulting from steady rainfall on plane road surfaces of brushed concrete and rolled asphalt with chippings has been compared and found to be similar. A formula has been established relating water depth to the drainage length, rainfall intensity, and slope. Increasing the slope of a pavement decreases water depth only slightly.

Search terms: Pavement surface texture; Highway characteristics; Rain; Wet road conditions; Concrete pavements; Asphalt pavements*; Highway drainage; Chips*

AVAILABILITY: Corporate author

HS-005 183 Fld. 5/4; 3/8; 2/7

AIR POLLUTION—THE PROBLEM AND THE RISKS

Anonymous

Published in *SAE Journal* v76 n5
p47-52 (May 1968)

Based on Part 1 of the report of the Panel on Electrically Powered Vehicles to the Commerce Technical Advisory Board (HS-000 722).

Discusses the sources of air pollution and summarizes the known facts about contaminants related to the auto: carbon monoxides, hydrocarbons, nitrogen oxides, oxidants, and lead compounds. The first three of 16 recommendations to the government on air pollution are also discussed: the national goal should be an atmosphere with no adverse effects on health; a research program should be established in the Environmental Science Services Administration to determine the relationships between pollution and weather; and the Department of Health, Education, and Welfare should develop infor-

mation dealing with the effects of air pollution on health.

Search terms: Air pollution effects; Air pollution control; Exhaust emissions; Carbon monoxide; Hydrocarbons; Lead (metal)*; Oxidizers*; Nitrogen oxides*; Environmental factors*; Public health*; Weather; Department of Health, Education, and Welfare*; Environmental Science Services Administration*

HS-005 184 Fld. 5/6; 3/8; 2/7

TECHNOLOGY AND THE CONTROL OF AUTOMOTIVE AIR POLLUTION

Anonymous

Published in *SAE Journal* v76 n6
p42-51 (Jun 1968)

Based on Part 2 of the report of the Panel on Electrically Powered Vehicles to the Commerce Technical Advisory Board (HS-001 275).

Discusses the gasoline and diesel engines and mass transit systems in relation to air pollution. Includes the use of unconventional systems such as electric cars. Recommendations 4-7 of a series of 16 recommendations to the government on air pollution are outlined: that the government should continue to establish standards for auto emission control and for lead content in gasoline, and that the effects of atmospheric lead on health should be studied; that emission standards for trucks and buses should be set; and that support for mass transportation research should be increased.

Search terms: Diesel engines Automobile engines; Exhaust emissions; Lead (metal)* Hydrocarbons Carbon monoxide; Air pollution control; Standards; Internal combustion engines; Electric automobiles; Public health; Trucks Buses (vehicles); Mass transportation; Gasoline

HS-005 213 Fld. 2/7

VEHICLE PERFORMANCE IN CROSSWINDS

by P. J. Milner

Published in *Automobile Engineer*
v58 n9 p352-55 (Aug 1968)

The influence of design and development parameters on steady-state vehicle response to crosswinds is discussed. Dynamic system analysis is used to determine path deviation, yaw, steering correction, and other aspects including driver behavior.

Search terms: Driver behavior; Motor vehicle performance; Motor vehicle handling; Yaw*; Vehicle stability; Parameters; Systems analysis; Wind (meteorology); Steering (driving); Steady state

HS-005 335 Fld. 2/6; 2/7

CORROSION INHIBITORS AS ADDITIVES TO HIGHWAY DE- ICING SALTS—LABORATORY TESTS

by R. R. Bishop; D. E. Steed

England. Road Research Lab., Crowthorne, Berks.

Published in *Institution of Mechanical Engineers Proceedings* v182 pt3J p1-6 (1968) 8p

Paper 1, presented at *Corrosion and its Prevention in Motor Vehicles* [Symposium] London, England, 28-29 Mar 1968.

Nearly a million tons of rock salt are used on roads in Great Britain during severe winters, and this causes some corrosion damage to motor vehicles. A 3% rock salt solution is 13 times more corrosive than rainwater to steel. Polyphosphate and chromate inhibitors were tested and found ineffective as corrosion inhibitors to bare steel, but polyphosphate was less corrosive to painted panels.

Search terms: Inhibitors; Ice removal; Laboratory tests; Corrosion prevention; Corrosion tests; Paints; Steels; Chromates*; Phosphates*; Rock salt*; Great Britain*

HS-005 442 Fld. 2/7; 2/1

VEHICLE SPRAY PATTERN STUDY. FINAL REPORT.

by Jack W. Anderson; Glen C. Carlson

Minnesota. Dept. of Highways, St. Paul

17 Aug 1966 39p
Report no. Investigation-338

2/7 Meteorological Conditions (Cont.)

HS-005-442 (Cont.)

Prepared in cooperation with
Bureau of Public Roads, Wash-
ington, D.C.

Investigates the pattern of spray from
passing vehicles to determine the
optimum lateral and vertical place-
ment of milepost markers for an
Interstate-type highway with wider,
paved shoulders.

Search terms: Reflecting surfaces;
Mud*; Road shoulders; Highway
design; Daylight driving*; Vehicle
spray; Night driving; Brightness;
Wet road conditions; Interstate
highway system; Highway signs;
Visibility

AVAILABILITY: Corporate author

HS-005 475 Fld. 5/22; 2/7

HYDROPLANING OR HOW TO BUILD A 3500-POUND WATER SKI

Anonymous

Published in *Air Force Driver* p1-4
(Apr 1969)

Discusses hydroplaning and how it is
influenced by speed, tire pressure,
water depth, road surface. Driving
skills for wet road conditions are out-
lined.

Search terms: Wet skidding;
Braking techniques; Speed; Tire
design; Inflation pressure; Driver
skills; Road surfaces; Wet road con-
ditions; Tire-road conditions

HS-006 163 Fld. 1/3; 2/7

JUST ADD WATER—AND INSTANT ACCIDENT

by Myron Sartain

Published in *Texas Parade* v29 n10
p34, 36-7 (Mar 1969)

Hydroplaning is now regarded as a
major cause of wet-weather accidents.
New research shows that with only
0.04 inches of water on the road
pavement, tires lose all contact with
road even at speeds well below the
legal limit. Two forms of hydro-
planing—dynamic and viscous—and

ways to prevent hydroplaning are
discussed.

Search terms: Wet skidding; Tire-
road conditions; Speed; Inflation
pressure; Wet road conditions;
Skidding accidents; Tire dynamics

HS-006 195 Fld. 3/12; 3/8; 1/3; 2/7

CALIFORNIA'S REDUCED VISI- BILITY STUDY HELPS CUT DOWN TRAFFIC ACCIDENTS WHEN FOG HITS AREA

by James E. Wilson

Published in *Traffic Engineering* v35
n11 p12-4, 44-51, 53 (Aug 1965)

Various means of giving advance
warning to drivers of the need for
greater driving caution during periods
of reduced visibility have been
studied. Studies were undertaken
after a series of chain reaction
crashes. Ways of affecting the driving
behavior of motorists who disregard
reduced visibility were tested. Signs,
speed limits, tailgating, headway,
traffic markings, increased patrol car
surveillance were studied.

Search terms: Fog; Driving con-
ditions; Visibility; California*;
Reduced visibility; Tailgating; Head-
way*; Traffic markings; Law
enforcement*; Police traffic
services; Highway signs; Speed
limits; Speed reduction; Driver
behavior; Accident causes

HS-006 225 Fld. 2/7

THE EFFECTIVENESS OF DARK- ENING SURFACE AND INSU- LATING BRIDGE SLABS TO REDUCE UNEQUAL ICING

by F. L. Holman

Alabama. Highway Dept.,
Montgomery

Jul 1968 90p 6 refs
Report no. HPR-39

Prepared in cooperation with
Bureau of Public Roads, Wash-
ington, D.C.

Two methods of retarding frost or ice
formation on bridge decks in
Alabama were tested. Tests involved
the use of urethane foam insulation
on the underside of bridge decks, and
dark bridge deck surfacing to equalize
the icing of the bridge deck and
approach pavement to reduce
skidding. Installation and instrumen-

tation are described. Results showed
that performance of either factor,
individually or together, although
effective to some degree, did not
justify their use in Alabama because
of the mild winter climate.

Search terms: Alabama; Bridges
(structures); Bridge approaches;
Bridge surfaces; Ice control; Pavement
skidding characteristics; Icy
road conditions; Temperature;
Winter; Wet road conditions;
Urethanes; Skid resistance; Thermo-
couples; Environmental factors

AVAILABILITY: Corporate author

HS-006 676 Fld. 2/7

SNOW-FIGHTERS GET PROMISE OF BETTER WEATHER FORECASTS

by Abraham Michaels

Published in *American City* v179 n6
p106-7 (Jun 1964)

The problems caused by snow on
streets, sidewalks, and roads are out-
lined. Forecasting of storms, legal
questions, the use of salt and other
means to melt snow and ice are
discussed.

Search terms: Legal factors; Snow;
Snow removal; Ice removal; Streets;
Sidewalks; Weather forecasting;
Sodium chloride

2/8 POLICE TRAFFIC SERVICES

HS-800 064 Fld. 2/8

THE TECHNICAL CONTENT OF STATE AND COMMUNITY POLICE TRAFFIC SERVICES PROGRAMS. FINAL REPORT
by Edward F. Fennessy, Jr., Robert L. Borkenstein, Hans C. Joks, Frank J. Leahy, Jr., Kent B. Joscelyn
Travelers Research Center, Inc., Hartford, Conn.

Sep 1968 536p
Contract FH-11-6604
Report no. RFP-161

This project documents the present status of police research, policies, and procedures, identifies enforcement and accident investigation criteria, and develops predetermined levels of police traffic services needs, including cost effectiveness.

Search terms: Police traffic services, Enforcement, Accident investigation, Cost data, Accident prevention, Accident factors, Injury factors, Statistical analysis, Safety research, Driver behavior, Community support, Accident causes, Traffic courts

AVAILABILITY: CFSTI as PB-177 863

HS-004 581 Fld. 2/8

CTSB-NUTI TRAFFIC TRAINING PRAISED BY POLICE CHIEFS
Anonymous

Published in Chicago Traffic Safety Review p1-2,4 (Sep-Oct 1968)

Describes three training courses available to suburban police departments in the Chicago area: traffic law enforcement, traffic accident investigation, and Illinois traffic laws.

Search terms: Police traffic services, Traffic

law enforcement, Illinois*, Accident investigation training, Traffic laws, Traffic courts, Accident reports

HS-004 884 Fld. 4/1,2/8

FOR GREATER TRAFFIC SAFETY
by Quinn Tamm

Published in Traffic Engineering v37 n8 p23-4 (May 1967)

The key elements in greater traffic safety are engineering, enforcement, and education. Police often have major responsibility in all three areas, as smaller cities lack traffic engineers. Closer cooperation is needed between traffic engineers and law enforcement officials. Each group can provide the other with much useful information.

Search terms: Traffic engineering, Traffic law enforcement, Data acquisition, Traffic safety, Education, Engineers*, Police

HS-005 269 Fld. 2/8

ELECTRONIC DATA PROCESSING FOR THE MANAGEMENT CONTROL OF POLICE TRAFFIC FUNCTIONS

by Richard R. Frederick

Published in Traffic Digest and Review v15 n2 p14-8, 23 (Feb 1967)

To achieve effective decision making and maximum results, good management of information is necessary. Management principles suggested are: assignment of manpower in proportion to the demonstrated need; selective enforcement directed toward violations which cause accidents and congestion.

Search terms: Data processing; Police traffic services; Traffic congestion; Manpower utilization*; Accident causes; Traffic violations; Decision making*; Traffic law enforcement

HS-005 336 Fld. 2/8

ENGINEERING + ENFORCEMENT = POSITIVE TRAFFIC CONTROL

by Paul C. Box

Published in Traffic Digest and Review v17 n2 p8-11, 17 (Feb 1969)

Reprinted from Public Safety Systems (May-Jun 1968).

Discusses the relationship between traffic engineering and police. Cooperation is necessary to provide optimum traffic control. Police advice on design should be considered. Guidelines for communication between traffic engineers and police are set forth.

Search terms: Police traffic services; Traffic engineering; Highway design; Law enforcement*; Traffic control

HS-005 389 Fld. 2/2; 2/8

THEY LOOK DOWN ON HIGHWAYS!

Anonymous

Published in Highway User p30-1 (Feb 1969)

The Illinois toll highway system maintains a helicopter to patrol the freeways and assist motorists in numerous ways. It has been used chiefly for spotting trouble, and its public service functions will be increased by equipping it to serve as an ambulance.

Search terms: Helicopters; Ambulances; Illinois*; Toll roads; Highway communication; Emergency services; Police traffic services

2/8 Police Traffic Services (Cont.)

HS-006 064 Fld. 2/8

AN ESSENTIAL TEAM FOR TRAFFIC SAFETY

by Donald L. Smith

Published in *Traffic Safety* v68 n1
p12-3 (Jan 1968)

Close liaison and cooperation between traffic engineers and traffic police is essential. Suggestions are made for engineers on the most effective ways of working with police departments

Search terms: Traffic engineering;
Traffic safety; Police traffic services

HS-006 424 Fld. 5/19; 2/8

MERRY CHRISTMAS, POLICE— THE WORLD OF THE CAR THIEF

by Joe Scalzo

Published in *Car Life* v16 n10 p34-7
(Nov 1969)

Car theft by both amateur and professional thieves, resale of stolen goods, problems in apprehension of the criminals are discussed. Nearly half of the 600,000-plus cars stolen in America in 1968 had their keys left in the ignition switch. A steering column lock is believed to be a deterrent to car theft.

Search terms: Theft; Stolen cars;
Theft protection; Police; Law enforcement; Insurance industry;
Ignition keys; Steering column locks

HS-820 061 Fld. 4/1; 2/8

HIGHWAY SAFETY PROGRAM PRIORITIES SEMINAR, FREDERICKSBURG, VIRGINIA, JULY 18-20, 1969. PROCEEDINGS, VOL. 7: ENFORCEMENT

National Highway Safety Bureau,
Washington, D.C.

1969 51p
Report no. PB-186 274

Traffic codes and laws are ineffective and meaningless without enforcement. The highway transportation system, and the driver in particular, require regulation and continuous control. Enforcement is thus concerned with human behavior within the confines of the highway system. While driver licensing and public health departments, courts, and safety groups conduct activities to regulate driver behavior, the police have the primary responsibility to make the system function. Police responsibility includes traffic law enforcement, accident management and investigation, and traffic direction and control. Costs and benefits for better traffic law enforcement are discussed. The Connecticut speed crackdown campaign results are included.

Search terms: Benefit cost analysis; Police traffic services; Driver licensing; Traffic courts; Driver behavior; Traffic law enforcement; Accident investigation; Traffic control; Safety campaigns; Speed studies; Connecticut; Traffic laws

AVAILABILITY: CFSTI as PB-186
274

HS-006 470 Fld. 3/12; 2/8; 2/9; 3/4

EFFECT OF POLICE SUPERVISION ON THE PERCEPTION OF TRAFFIC SIGNS AND DRIVING HABITS

by Matti Syvanen

Central Organisation for Traffic
Safety in Finland, Helsinki (Finland)

1968 27p 11 refs
Report no. TALJA-6

Bound with THE CONSPICUITY
OF TRAFFIC SIGNS AND
FACTORS AFFECTING IT,
p35-57.

The effects of police supervision on driver perception of a traffic sign were studied. If a police car was parked near the traffic sign, drivers observed the car but only 29.2% observed the sign. If the car was parked further from the sign, 52.% of drivers noticed the sign. Other aspects of the influence of police supervision on driver behavior are also discussed. Presence of a patrol car causes a decrease in poor driving habits.

Search terms: Police traffic services; Finland; Driver behavior; Visual perception; Traffic signs; Traffic surveillance; Police cars; Careless driving

AVAILABILITY: Corporate author
(Bound with HS-006 469)

HS-006 503 Fld. 2/8; 5/3

THE MOTORCYCLE SQUAD

by Walter R. Koenig

Published in *Law and Order* v17 n9
p22-6 (Sep 1969)

The usefulness of a police motorcycle squad is discussed. Traffic law enforcement, safety campaigns, accident investigation are among the areas the squad can serve.

Search terms: Motorcycles; Police traffic services; Traffic law enforcement; Accident investigation; Safety campaigns

HS-006 614 Fld. 2/8

THE POLICE JOB ON THE SUPER ROADS

by Bradford M. Crittenden

Published in *Traffic Safety* v64 n4
p24-6, 37 (Apr 1964)

Police services needed on the Interstate Highway System are discussed. It is suggested that traffic volume is the most significant factor in determining police responsibility. Congestion and protection from criminals are also important. In addition to these functions, police may assist stalled motorists, deliver messages, and perform other similar services. It

2/8 Police Traffic Services (Cont.)

HS-006-614 (Cont.)

is predicted that police in the future will perform more such services.

Search terms: Interstate highway system; Traffic congestion; Police traffic services; Traffic volume; Crime; Disabled vehicles

Search terms: Rhode Island; Traffic flow; Police traffic services; Accident prevention; Manpower utilization; Public relations; Safety campaigns; Suburban areas

HS-006 677 Fld. 2/8

A PORTABLE ROADBLOCK

by Jeremiah O'Leary

Published in *FBI Law Enforcement Bulletin* v38 n11 p9-11, 20 (Nov 1969)

An emergency roadblock is described which can stop a car traveling at 80 mph in less than 200 feet. The device consists of a net assembly strung across the road. It is small enough to be carried in the trunk of a police car, causes little damage to the car being stopped, and is safer than parking a police car across the road. The device can also be used for various traffic control purposes. A table of vehicle stopping distances is included for use with the device.

Search terms: High speed; Police traffic services; Police cars; Traffic control devices; Stopping distance; Roadblocks; Deceleration; Energy absorption

HS-006 728 Fld. 2/8; 1/3

AUTOMATED ALLOCATION OF TRAFFIC ENFORCEMENT SERVICES

by Edwin J. Mendozzi

Published in *Law & Order* v17 n6 p84-6, 90, 92 (Jun 1969)

Describes how a small Rhode Island town coped with increased traffic flow through a suburban community without devoting a disproportionate share of police resources to this effort. A comprehensive traffic accident prevention program was developed, taking into consideration staff training, optimum manpower utilization, public education, community relations, and information services.

2/9 TRAFFIC CONTROL

HS-003 805 Fld. 2/9

NATIONAL PROVING GROUND FOR FREEWAY SURVEILLANCE CONTROL AND ELECTRONIC TRAFFIC AIDS'

by Edward F. Gervais

National Proving Ground, Detroit, Mich.

14-15 Sep 1964

Describes project effort in two main areas: Traffic research and equipment development. Summarizes studies on new sensing equipment; offers prognostications on future developments.

Search terms: Traffic surveillance; Electronic traffic control; Traffic control devices; Test facilities; Television systems; Lane changing; Ramps; Traffic volume; Travel time; Highway communication; Vision

AVAILABILITY: In Proceedings of Highway Conference on the Future of Research and Development in Traffic Surveillance Simulation and Control. 1966, p193-203 (HS-003 798)

HS-004 351 Fld. 2/9

A STOP SIGN FOR USE IN THE DARK

Stichting Wetenschappelijk Onderzoek Verkeersveiligheid, Voorburg (Netherlands)

Oct 1968 21 p

Nighttime stop signs in the Netherlands are inadequate for road users. A new stop sign has been developed, which in daylight looks the same as the existing one—a white disc with red edge—but differs from it when seen at night. It incorporates a red light and a small blue "point light" which flash alternately. Detailed specifications are included.

Search terms: Night vision; Traffic signs; Traffic signs; Netherlands

AVAILABILITY: Corporate author

HS-004 366 Fld. 2/9; 3/4

SCIENTIFIC INQUIRIES AND INVESTIGATIONS ON TRAFFIC SAFETY QUESTIONS IN CONNECTION WITH CHANGE-OVER TO RIGHT-HAND TRAFFIC

by A. Englund

Sweden. Commission for Right-Hand Traffic, Stockholm

Summarizes the scientific and investigative research of the following: The Learning Group; the Teaching Group; the Mass Media Group. Lists reports submitted to the Commission concerning the change-over to right-hand traffic in Sweden.

Search terms: Traffic safety programs; Right-hand traffic; Driver education; Driver behavior; Sweden

AVAILABILITY: Corporate author

HS-004 381 Fld. 2/9

SONIC WAVES KEEP TRAFFIC FLOWING

Published in American City v83 n7 p148-9 (Jul 1968)

Describes overhead-sonic devices used to count vehicles. Pulses of ultrasonic energy are transmitted from the transceiver toward the roadway. These pulses reflect back to overhead units once any vehicle moves into the detector's zone of influence.

Search terms: Traffic counters, Sonics, Ultrasonics

HS-004 405 Fld. 2/9

ADVISOR SPEED SIGNS AND THEIR EFFECT ON TRAFFIC

by D. C. Kneebone

Published in Australian Road Research Board Proceedings v2 pt1 p524-41

Advisory speed signs were erected on over 2,600 miles of roads in New South Wales. Result was usually a reduc-

tion in both casualty accidents and number of people injured. Experience indicates reductions of up to 60% may be expected. Instruments and survey methods used to calculate safe speed of curve are described. Advisory speeds were adjusted to the nearest 5 m.p.h increment below the safe speed.

Search terms: Speed limits, Speed studies, Highway signs, Measuring instruments, Road safety, Photography, Photometry, Safety research, Australia

HS-004 406 Fld. 2/9

INSTANT-DRY TRAFFIC MARKERS

Anonymous

Published in American City v83 n7 p121-2 (Jul 1968)

Describes a system which requires skilled operators and specialized equipment to apply. A large, truck-mounted melting unit, an application machine, and a small hand-operated machine to provide markings for crosswalks are used.

Search terms: Markers, Traffic control devices, Lane lines, Thermoplastics

HS-004 407 Fld. 2/9

RAISED MARKERS REPLACE PAINTED LINES

by Henry Vadnais

Published in American City v83 n9 p150,152 (Sep 1968)

Reflective markers may be installed easily with power tools in any type of weather and with minimum disruption traffic.

Search terms: Lane lines, Markers, Reflectors, Traffic control devices

HS-004 408 Fld. 2/9

TAKING THE ACCIDENTS OUT OF AN INTERSECTION

by Donald E. Pipes

Published in the American

2/9 Traffic Control (Cont.)

HS-004-408 (Cont.)

City v83 n9 p154 (Sep 1968)

Describes a congested intersection used by 34,000 cars per day. A traffic control device, six loop detectors, and 16 new signals have reduced both congestion and accidents.

Search terms: Intersections, Traffic congestion, Traffic control devices, Accident rates

HS-004 420 Fld. 4/7,2/9

DATA REDUCTION SYSTEM FOR TRAFFIC FLOW SENSING AND SURVEILLANCE SYSTEM
Cornell Aeronautical Lab., Inc., Buffalo, N.Y.

30 Sep 1968 48p
Contract CPR-11-0956
Report no. CAL-YB-1957-x-104

Planning requires large samples of detailed information about traffic behavior at actual intersections, especially quantitative information on vehicle position, attitude, velocity, and deceleration in interval before accidents. An engineering model for gathering this information in the form of calibrated moving pictures is described. Data can be put on magnetic tape and processed on a general purpose digital computer.

Search terms: Traffic planning, Traffic characteristics, Digital computers, Magnetic tapes, Intersections, Velocity, Deceleration, Photography, Accident research, Traffic data analysis, Models, Intersections

HS-004 477 Fld. 2/9

EFFECTS OF PAINT CHANNELIZATION ON ACCIDENTS
by D. S. Terry, Arthur L. Kassar

Published in Traffic Engineering v39 n3 p22-6
(Dec 1968)

Accidents on Wilshire Boulevard, Los Angeles, were reduced 38% after painted channelization. Traffic also flowed more smoothly on this heavily used street. Much of the improvement came from the painted "storage pockets" for left turns.

Search terms: Lane lines, Los Angeles, Traffic flow, Accident rates, Accident prevention, Turning left, Traffic lanes, Turning lanes

HS-004 478 Fld. 2/9

HOW TO IDENTIFY "LOST" SIGNS
by Douglas J. Carmody

Published in Rural and Urban Roads v6 n12 p6, 10 (Dec 1968)

About 4 or 5% of signs are knocked down or stolen each year. The city of Modesto, California, has found it desirable to paint on the back of the sign the location where it belongs so that those which are found can be quickly replaced. City may incur liability for accidents caused by absence of signs.

Search terms: Accident causes, Signs (displays), Traffic signs, Legal responsibility

HS-004 479 Fld. 2/9

SNAP! THE LAW WINS
Anonymous

Published in Robot n39 p7
(Aug-Sep 1968)

Describes experiment with camera mounted on police car to photograph drivers in the act of committing violations, recording time, date, and speed. Purpose is to save traffic policemen's court time and to act as a deterrent.

Search terms: Photography, Traffic control devices, Police cars, Traffic violations, Speed, Police

HS-004 480 Fld. 2/9,3/4

SOME ASPECTS AND PROBLEMS OF A HUMAN ENGINEERING STUDY OF ROAD FEATURES
by J. T. Smith

Published in Australian Road Research Board v2 pt1 p552-66 (1964)

Describes a method of evaluating information displays (road signs) using the concept of limited channel capacity. In a laboratory experiment, subjects were given a secondary tracking task while being presented at random times with road situations requiring one of five possible actions. The experiment showed that use of this method makes possible statistical evaluation of situations requiring varying amounts of time and concentration to reach a decision. This method permits evaluation of recognition and legibility of road signs and warning systems.

Search terms: Signs (displays), Human engineering factors, Driver performance studies, Driver behavior, Laboratory experiments, Tracking (position), Steering (driving), Driving conditions, Warning systems

HS-004 515 Fld. 1/3,3/12,2/9

IMPROVING VISIBILITY OF THE HIGHWAY SIGNS AS A MEANS OF ACCIDENT PREVENTION
by Theodore W. Forbes

1967

The importance of visibility for safe driving under very bad conditions is generally recognized. Under ordinary conditions its importance, though not so well recognized, may be even greater because visibility limitations may present surprises to the driver. Most visibility

2/9 Traffic Control (Cont.)

HS-004-515 (Cont.)

deficiencies have been designed out of freeways. Methods of improving visibility on secondary roads and city streets are suggested.

Search terms: Visibility, Highway signs, Accident prevention, Streets

AVAILABILITY: In Mich. Univ. Prevention of Highway Injury, p113-7 (HS-004 500)

HS-004 541 Fld. 2/9,3/0

APPLICATION OF HUMAN FACTORS RESEARCH IN DESIGN OF WARNING DEVICES FOR HIGHWAY-RAIL GRADE CROSSINGS by Slade F. Hulbert, Albert Burg

Published in National Cooperative Highway Research Program Factors Influencing Safety at Highway-Rail Grade Crossings p82-105 (NCHRP-50) 149 refs (1968)

Discusses the human factors approach; available sensory channels (vision, etc.) factors influencing probability of signal detection; driver response to detected signals. Offers suggestions for development and evaluation of designing new warning systems.

Search terms: Human factors engineering, Warning systems, Railroad grade crossings*, Grade crossings (highways)*, Highway design, Driver behavior, Vision*, Auditory perception, Skin (anatomy), Psychological factors, Signal devices

HS-004 542 Fld. 2/9

DATA REDUCTION SYSTEM FOR TRAFFIC FLOW SENSING AND SURVEILLANCE SYSTEM Cornell Aeronautical Lab., Inc., Buffalo, N. Y.

30 Sep 1968 46p

Contract CPR-11-0956
Report no. CAL-YB-1957-X-104

An engineering model Traffic Flow Sensing and Surveillance System has been developed. Work accomplished towards a complete system for reading and recording (from films onto magnetic tape) on a general purpose digital computer for printout and plotting of the desired detailed traffic flow information is described.

Search terms: Computerized simulation, Electronic traffic control, Systems engineering, Digital computers, Traffic flow, Surveillance, Computer programs, Data reduction, Detectors, Television systems, Mathematical models, Photogrammetry*, Photography

HS-004 543 Fld. 2/9,4/7

PROBLEMS WITH TURNPIKE TRAFFIC INDEXES: CONSTRUCTION AND FORECASTING by Wesley H. Long

Published in Traffic Quarterly v22 n2 p345-58 (Jul 1968)

Regression and dummy variable techniques are used to overcome problems in constructing monthly traffic indexes for growing highways. Changing seasonal adjustment factors should be used, since seasonal traffic patterns are a continually developing phenomenon. The index computer taking account of these considerations has been used in examples of traffic prediction, illustrating some uses to which traffic data can be put. Projections are useful in planning highway construction, estimating tool revenues, disposition of state police, measuring tourism. Study was based on Maine Turnpike.

Search terms: Statistical analysis, Regression analysis*, Variables*, Traffic flow patterns, Traffic research, Police, Computers, Highway planning, Tourists*,

Tolls (changes),
Maine*

HS-004 582 Fld. 2/9

CONSIDERATIONS FOR SIGNALIZED INTERSECTIONS by George W. Howie.

Published in Public Safety Systems p20-2 (Jul/Aug 1968)

Traffic signals should not be installed without planning, including timing, coordination with other signalized locations signs and markings, and channelizing. Signs should be internally illuminated with fluorescent tubes and carefully located. A number of commonly made design errors are outlined.

Search terms: Traffic signals, Traffic planning, Signal lights, Signs (displays), Time factor, Lighting equipment

HS-004 583 Fld. 2/9

RAIL-HIGHWAY GRADE CROSSING SAFETY EVALUATION. AN INTERIM REPORT by Hoy A. Richards, G. Sadler Bridges, Jack T. Lamkin Texas A and M Univ., College Station. Texas Transportation Inst.

13 Sep 1967 72p
Report no. Research-111-1;
Grade Crossing Study-2-8-67-111

Inventories rail-highway grade crossings--classifying by type of highway surfacing; train speed at crossing, type of protection. Initial accident data was collected to develop hazard rating. Tentative findings indicate that a regression model may be the best statistical approach.

Search terms: Railroad grade crossings*, Crossings, Railroads, Accident locations, Accident investigation, Texas*, Safety inspection, Warning systems, Accident data, Hazards, Accident records, Safety inspection, Regression analysis*, Statistical analysis

2/9 Traffic Control (Cont.)

HS-004 584 Fld. 2/9

STUDY TACKLES PROBLEM OF GRADE-CROSSING ACCIDENTS

Anonymous

Published in Better Roads
v38 n12 p21,24 (Dec 1968)

There are some 220,000 highway-rail grade crossings in the U.S., of which about 44,000 have some kind of special protection. Flashing lights or automatic gates are economically warranted at crossings that have high vehicle and train traffic. On a hazard basis, grade separations are almost never warranted because greater rate of return can be had with flashing lights or gates. Separations may be warranted on systems basis because of vehicle delays. Types of signs which should be used are also discussed.

Search terms: Traffic control devices, Barriers, Warning systems, Lighting equipment, Time factor, Signs (displays), Railroad grade crossings*, Grade crossings (highways)*, Crossings, Hazards, Highway design, Traffic volume

HS-004 585 Fld. 2/9

TRAFFIC SIGNAL BASICS

Anonymous

Published in Rural and Urban Roads v4 n6 p44-5,51-3,61
(Jun 1966)

Discusses merits of pre-timed versus traffic-actuated signals. Factors to be considered in choosing pre-timed signals are minimum vehicular volume, interruption of continuous traffic, minimum pedestrian volume, progressive movement, accident experience, or combinations of these. For traffic-actuated signals, factors to consider are vehicular volumes, cross traffic, peak hour volumes, accident hazard, traffic fluctuations between streets, complicated intersections, and progressive

signal systems. Number of lenses, signal faces, clearance interval, and flashing operation of signals are also discussed.

Search terms: Traffic signals, Traffic flow,

Traffic volume, Pedestrian, Accident factors, Peak hour traffic, Intersection, Traffic control

HS-004 632 Fld. 2/4,2/9,2/7

STUDY OF ELECTRICALLY HEATED BRIDGE DECKS FOR ICE PREVENTION

by H. D. Butler
Texas. Highway Dept.,
Austin

Mar 1968 80p
Contract 1-5-63-72
Report no. RR-72-1-F

Reports the design, construction, and study of 3 electrical heating systems to prevent ice and snow formation on bridges. Systems were found to be feasible and economical. Additional research is required to study the relationship between slab thickness and heat distribution.

Search terms: Bridge decks*, Bridge design, Ice prevention*, Ice removal, Electric heating*, Snow removal, Concrete pavements, Texas*, Cost data

AVAILABILITY: From
corporate author

HS-004 634 Fld. 2/9,1/1

TRAFFIC CONTROL ON MOTOR- WAYS

Anonymous

Published in Roads and
Road Construction p302
(Oct 1966)

Describes a small truck used by police as an accident emergency unit. It carries large illuminated accident signs, traffic directing signs, first aid box and blankets, hand lamps, flares, crowbar, fluorescent coats, reflect-

ing cones, two way radio, and public address equipment. Its purpose is to get to accident scene quickly and reduce hazard of multiple pile-ups.

Search terms: Traffic control devices, First aid, Lighting equipment, Warning systems, Emergency vehicles, Public address systems*, Highway communication, Communication systems*, Accident surveillance, Signs (displays), Accident risks, Police traffic services

HS-004 691 Fld. 2/9

KENTUCKY USED AN INSTANT ALARM SYSTEM TO WARN MOTORISTS OF ICE ON BRIDGE

Anonymous

Published in Better Roads
v38 n11 p26-7 (Nov 1968)

Ice detector senses moisture and low temperature combination, relays signal to state police barracks and turns on warning signs for motorists. It can also relay a fog message.

Search terms: Icy road conditions, Police traffic services, Signs (displays), Temperature warning systems, Ice formation indicators*, Fog, Warning systems, Fog signals*

HS-004 692 Fld. 2/9

LET'S STOP CONFUSING THE DRIVER

by Harry Porter, Jr.

Published in Traffic Safety
v67 n6 p8, 9, 34 (Jun 1967)

Offers 4 compelling reasons to give the best possible protection in construction and maintenance zones: accident protection to the motorist, protection of the workmen, avoidance of civil suits, meeting the standards required by the federal government under the Highway Safety Act of 1966.

2/9 Traffic Control (Cont.)

HS-004-692 (Cont.)

Search terms: Industrial accidents*, Highway construction, Accident prevention, Signs (displays), Traffic control, Highway Safety Act of 1966*, Safety standards, Detours*, Hazardous materials*

HS-004 693 Fld. 2/9

MAJOR INTERSECTION IMPROVEMENT--AN URBAN EXAMPLE
by Paul C. Box

Published in Public Safety Systems p13-6 (Jul/Aug 1968)
Expanded presentation to Institute of Traffic Engineers meeting, June, Des Moines

Describes improvements made to an intersection in Skokie, Illinois. Accident and congestion studies were first made. Improvements showed that parking prohibition can result in positive accident reduction, as can control of driveway left turns, and that six-leg intersections can be eliminated in a number of ways. Travel time was improved and accidents reduced.

Search terms: Accident prevention, Accident factors, Parking, Turning left, Intersections, Travel time, Streets, Highway design, Traffic congestion, Illinois*

HS-004 694 Fld. 2/9,1/3

TRAFFIC CONTROL MEASURES IMPROVE SAFETY
by Joseph G. Crossette, George L. Allen

Published in Traffic Engineering v39 n4 p18, 20, 21 (Jan 1969)

Compares traffic operations before and after the installation of 3 traffic control measures: painted median channelization prohibition of curb parking; signal syn-

chronization. Net benefits for the first year (\$42,000) indicate the value of such measures.

Search terms: Traffic control, Traffic markings, Turning left, Curb parking, Traffic signals, Accident prevention, Benefit cost analysis*, Cost data, Travel time, Traffic flow, Accident types, Rear end collisions

HS-004 756 Fld. 2/9,3/4

DAYTIME HEADLIGHTS AND POSITION ON THE HIGHWAY
by Merrill J. Allen, Jerry Strickland, Brian Ward, Art Siegel

Published in American Journal of Optometry and Archives of American Academy of Optometry v46 n1 p33-36 (Jan 1969)

Presented at the Annual Meeting, American Academy of Optometry, 14 Dec 1964, Columbus, Ohio

A method of sampling the effects of using daytime headlights against oncoming traffic through photography is presented. It is concluded that driving with headlights "on" in the daytime on sunny days produces an apparent improvement in the position of oncoming traffic in its own lane.

Search terms: Daylight driving*, Time factors, Weaving traffic, Headlights, Driver performance, Accident prevention, Highway Safety, Photography, Visibility

HS-004 757 Fld. 2/9

THE EFFECT OF FLASHING TRAFFIC CONTROL DEVICES ON ACCIDENT OCCURRENCE. FINAL REPORT.
by William C. Taylor, Thomas J. Foody, H. Richard Blackwell, Joseph Treiterer, Bruno Van Den Branden
Ohio. Dept. of Highways,

Columbus. Bureau of Traffic, and Ohio State Univ., Columbus

Dec 1967 59p
Report no. 1-14820;
PB-178 292
Prepared for Bureau of Public Roads

Purpose of study was to define intersection characteristics related to a reduction in the accident rate in order to determine where the use of flashing devices should be extended. Accident history at intersections throughout Ohio was studied. Of the five types of flashing devices studied, use of three types resulted in significant reduction in the accident rate. The most conspicuous stop-warning system was not the most successful in reducing the accident rate; conspicuity alone is not a good predictor of effectiveness.

Search terms: Intersections, Accident rates, Traffic control devices, Ohio*, Accident prevention, Signal lights, Flashing systems, Warning systems

AVAILABILITY: From CFSTI as PB-178 292

HS-004 758 Fld. 2/9

NEW BUREAU OF PUBLIC ROADS HIGHWAY TRAFFIC SYSTEMS WILL AID DRIVERS, PROVIDE TRAFFIC CONTROL
by Curtis L. Shufflebarger
Bureau of Public Roads, Washington, D. C.

Published in SAE Journal v77 n2 p56-7 (Feb 1969)

Describes three new electronic traffic aids which will be installed at selected highway sites. These are: electronic route guidance system (ERGS), merge control system, and passing aid system (PAS). Other systems are also being developed.

Search terms: Traffic control devices,

2/9 Traffic Control (Cont.)

HS-004-758 (Cont.)

Electronic devices,
Passing aid systems,
Merging traffic,
Electronic route guidance
system*

HS-004 775 Fld. 4/1,2/9

STATUTE ON UNIFORM SIGNS
STIRS MUNICIPAL ACTION
by Merle D. Banks

Published in Public Works
v100 n2 p102-3 (Feb 1969)

The cost of standardization
and a suitable program to
meet the state requirements
for uniform signing were
products of a study made
by consulting traffic
engineers retained by the
city of Galesburg, Illinois.

Search terms: Signs
(displays), Design
standards, Cost data,
State laws, Traffic
signs, Urban areas,
Illinois*, Local
government*

HS-004 778 Fld. 4/7,2/9

AN EXTENDED MODEL FOR CAR-
FOLLOWING
by Sten Bexelius

Published in Transportation
Research v1 n1 p13-21
(Mar 1968) 14 refs

Reviews the work of various
authors on car-following
models and compares equations
used.

Search terms: Mathematical
models, Traffic flow
patterns, Equations,
Following distance

HS-004 810 Fld. 2/4,2/9

LEFT TURN BAY LAYOUT
by Paul C. Box

Published in Public Safety
Systems v34 n1 p21-4
(Jan-Feb 1969)

Left turn restrictions may

increase intersection capacity
or reduce accidents, but they
are not always possible.
This article reviews typical
layout principles for left
turn bays--approach and
departure tapers, channeli-
zations, special markings--as
an alternate solution.

Search terms: Turning left,
Traffic control, Left
turn bays*, Traffic lanes,
Traffic markings, Urban
areas

HS-004 814 Fld. 2/9,4/7

THE OVERSATURATED SIGNALIZED
INTERSECTION--SOME STATISTICS
by C. J. Ancker, Jr.,
A. V. Gafarian, R. K. Gray
Published in Transportation
Science v2 n4 p340-61
(Nov 1968) 13 refs

Data on the time between
arrivals of successive
vehicles at an intersection
with no downstream bottle-
neck were collected and
analyzed. Statistical
analysis will be used to
provide information for
Monte Carlo simulations of
traffic phenomena.

Search terms: Statistical
analysis, Simulation,
Mathematical models, Data
acquisition, Traffic
density, Traffic flow,
Intersections, Signal
lights, Computers

HS-004 815 Fld. 2/9

IN FURTHER SUPPORT OF RUMBLE
STRIPS
by Dan W. Hoyt

Published in Traffic Engineer-
ing v39 n2 p38-41 (Nov 1968)

Discusses accident reduction
results at nine rumble strip
installations in Illinois
and presents pertinent data
in support of this highway
feature as an effective safety
device. Increase in road
noise while travelling over
rumble strips warns driver
of impending hazards, particu-
larly on roads where approach
speeds are high.

Search terms: Rumble strips*,
Illinois*, Highway surfaces,
Noise (sound), Accident
prevention, Accident rates,
Safety devices, High speed

HS-004 816 Fld. 2/9

PROTECTING RAILROAD CROSSINGS
AT GRADE
Anonymous

Published in Better Roads
v34 n3 p15-6,29,32
(Mar 1964)

Outlines how highway depart-
ments determine where automatic
devices are needed at grade
crossings, who pays for them,
and who maintains them.

Installation depends on the
index of hazard and the amount
of rail and road traffic,
chiefly. Railroads are
responsible for the maintenanc
and costs are shared by rail-
roads and counties where
crossings are located.

Search terms: Railroad
grade crossings*, Hazards,
Traffic volume, Railroads,
Maintenance, Costs*,
Traffic control devices,
Warning systems, Highway
safety, Accident prevention

HS-004 817 Fld. 2/9

THE ORTHODOX IS NOT NECESSARILY
THE ANSWER
by R. W. Walker

Published in Medicine, Science
and the Law v3 p516-20
(Oct 1962)

Discusses successful experi-
ment in an English community
where, in order to reduce
accidents, uncontrolled cross-
roads were marked with solid
white lines. Results of exper-
iment showed two-thirds decrease
in accidents. Suggests that
this practice be made standard
Also discusses parking problem

Search terms: Great Britain*
Accident prevention,
Parking, Intersections,
Accident rates, Traffic
markings

2/9 Traffic Control (Cont.)

HS-004 818 Fld. 2/9

THE USE OF STOP SIGNS AT RAILROAD CROSSINGS
by Georgy Bezkorovainy,
Robert G. Holsinger
Lincoln. Traffic Engineering
Dept., Nebr.

Mar 1966 55p 19 refs

Driver reaction was observed at 13 railroad crossing STOP signs in Lincoln, Nebraska. Train speeds, traffic volumes, etc., do not significantly influence driver action. The STOP sign was not found an effective railroad crossing protective device.

Search terms: Railroad grade crossings*, Stop signs*, Driver behavior, Visibility, Traffic signs, Data acquisition, Chi square test, Daylight driving*, Night driving, Traffic characteristics

AVAILABILITY: From corporate author

HS-004 819 Fld. 2/9,1/3

THE LANE DROP STUDY (RELATING ROADWAY ELEMENTS TO ACCIDENTS)
by Edward J. Tye
California. Dept. of Public Works, Sacramento. Traffic Dept.

Jun 1968 40p
Contract HPR 1(5) B-1-11
Report no. PB-179 439

Lane drops on California highways were evaluated; accident rates were calculated. Findings reveal transitions on curves resulted in from 2 to 10 times the accident rate for tangent transitions within the same lane drop category.

Search terms: Lane drops*, Traffic lanes, Accident location, California*, Accident rates, Merging traffic, Lane lines*, Chi square test

AVAILABILITY: From CFSTI

HS-004 870 Fld. 2/7,2/9

THE AUTOMATIC ICE DETECTOR
Anonymous

Published in Highway User
p24-5 (Feb 1969)

The Michigan Highway Department has developed a system which electronically warns motorists of icy bridge conditions. Detector consists of a humidity sensor and an ambient temperature sensor mounted on bridge railing and deck sensors. Warning signs are turned on automatically.

Search terms: Ice formation indicators*, Icy road conditions, Temperature, Bridge surfaces, Electronic devices, Warning systems, Humidity*, Signs (displays)

HS-004 871 Fld. 2/9,3/4

URBAN INTERSECTION STUDY.
Vol. 1, SUMMARY REPORT
by Kenneth R. Laughrey,
Edwin A. Kidd
Cornell Aeronautical Lab.,
Inc., Buffalo, N. Y.

Sep 1968 66p 14 refs
Contract CPR-11-2856
Report no. CAL-VJ-2120-V-1;
PB-180 120

Final technical report.

A computer simulation model was formulated to investigate traffic movement through urban intersections. Driver's perceptual, decision making, and response processes were considered crucial factors, but vehicle characteristics and environmental conditions were also studied. Experiments included specific laboratory and full-scale studies as well as actual traffic observation. A literature survey was made to locate related studies.

Search terms: Computerized simulation, Traffic simulation, Intersections, Driver behavior, Laboratory tests, Environmental factors, Traffic data analysis, Driver performance, Urban intersections*

AVAILABILITY: From CFSTI as
PB-180 120

HS-004 872 Fld. 2/9,3/4

URBAN INTERSECTION STUDY.
VOL. 2, A COMPUTER SIMULATION MODEL OF DRIVER BEHAVIOR AT INTERSECTIONS.
by Theodore E. Anderson,
Edwin A. Kidd,
Kenneth R. Laughrey
Cornell Aeronautical Lab.,
Inc., Buffalo, N. Y.

Sep 1968 269p 14 refs
Contract CPR-11-2856
Report no. CAL-VJ-2120-V-2;
PB-180 121

Final technical report.

A computer model was formulated to simulate traffic approaching, passing through, and leaving an intersection controlled by either a two-way stop sign or a four-way traffic light. The model was limited to two-lane roads, 35-50mph speeds, no pedestrians, no passing, daylight, and no obstructions to the driver's view. Driver, vehicle, and environmental characteristics were considered, with primary emphasis on the driver. Model is not considered valid in its present state but results are encouraging, and validation of the model or parts of it may now begin. A valid model of driver behavior and vehicle performance could be valuable in planning highways, training drivers, and establishing traffic regulations.

Search terms: Computerized simulation, Traffic simulation, Intersections, Driver behavior, Traffic signals, Stop signs*, Two lane highways, Speed, Pedestrians, Passing (driving), Visibility, Motor vehicle characteristics, Environmental factors, Highway planning, Highway design, Driver education, Traffic regulations*, Traffic data analysis, Urban intersections*

AVAILABILITY: From CFSTI as
PB-180 121

HS-004 873 Fld. 2/9,3/4

URBAN INTERSECTION STUDY.
VOL. 3, EXPLORATORY STUDY OF INDIVIDUAL DRIVER BEHAVIOR

2/9 Traffic Control (Cont.)

HS-004-873 (Cont.)

by Theodore E. Anderson,
Kenneth R. Laughery,
David E. Maurer
Cornell Aeronautical Lab.,
Inc., Buffalo, N. Y.

Sep 1968 61p
Contract CPR-11-2856
Report no. CAL-VJ-2120-V-3;
PB-180 122
Final technical report.

To provide data for a computer model to simulate traffic approaching an intersection, a full scale study of velocity patterns and scanning was made. Control variables used were traffic light, two-way stop sign with stop, and two-way stop sign with right-of-way. Speed variables were approximately 35mph and 50mph. Maneuvers used were straight through, left turn, and right turn. Four male subjects with considerable driving experience drove the test course twice each, once at each speed, while data were recorded by oscillograph and camera. Results were time histories of velocity, acceleration, accelerator deflection, and brake deflection. Study showed that useful and accurate simulation model of the automobile driver can be attained. Results are presented in table and graph form.

Search terms: Intersections, Traffic signals, Stop signs*, Computerized simulation, Deceleration patterns, Driver performance, Driver behavior, Right-of-way (traffic rules)*, Turning right, Turning left, Photography, Speed, Acceleration patterns, Braking, Driving simulation, Oscillographs*, Traffic data analysis, Urban intersections*

AVAILABILITY: From CFSTI as
PB-180 122

HS-004 874 Fld. 2/9,3/4

URBAN INTERSECTION STUDY.
VOL. 4, HEADWAY CHANGE

DETECTION DURING CAR-FOLLOWING
by David Edwin Maurer
Cornell Aeronautical Lab.,
Inc., Buffalo, N. Y.

Sep 1968 66p 34 refs
Contract CPR-11-2856
Report no. CAL-VJ-2120-V-4;
PB-180 123
Final technical report.

Describes laboratory simulation with 35 volunteers to study driver detection of headway (defined as the distance between the front of a following-car and the rear of a lead-car) under various conditions. Four independent variables were investigated: velocity-headway combination at four levels, magnitude of acceleration or deceleration at three levels, acceleration vs. deceleration, and duration of steady-state time. Resulting data were tabulated, and analysis revealed a triple interaction between magnitude of acceleration, direction of acceleration, and velocity-headway combination. Background information is included giving results of previous studies in motion detection.

Search terms: Intersections, Driver performance, Following distance, Traffic simulation, Speed, Acceleration (physics), Deceleration, Laboratory tests, Traffic data analysis, Gap acceptance*, Driver behavior, Motion perception*, Urban intersections*

AVAILABILITY: From CFSTI as
PB-180 123

HS-004 875 Fld. 2/9,3/12

URBAN INTERSECTION STUDY.
VOL. 5, JUDGMENT OF
VELOCITY IN TWO DIMENSIONS
by Edwin A. Kidd
Cornell Aeronautical Lab.,
Inc., Buffalo, N. Y.

Sep 1968 146p 25 refs
Contract CPR-11-2856
Report no. CAL-VJ-2120-V-5;
PB-180 124
Final technical report.

A study of the effects of velocity in two dimensions on the ability to judge

collision causes with binocular viewing and the possible preceptual mechanisms involved. Both laboratory and full-scale studies were performed with the following variables: velocity of observer, velocity of stimulus object, stimulus temporal pattern (continuous and intermittent) dark and illuminated field, and distance of stimulus from observer. Results are discussed and tabulated.

Search terms: Intersections, Speed, Driver performance, Crash research, Laboratory tests, Road tests, Driver behavior, Visibility, Collisions (accidents), Visual perception, Reaction time, Travel time, Traffic data analysis, Illuminance, Urban intersections*

AVAILABILITY: From CFSTI as
PB-180 124

HS-004 876 Fld. 2/9,3/4

URBAN INTERSECTION STUDY.
VOL. 6, THE DRIVER IN A
REAL LIFE ENVIRONMENT
by Richard A. Raub
Cornell Aeronautical Lab.,
Inc., Buffalo, N. Y.

Sep 1968 164p
Contract CPR-11-2856
Report no. CAL-VJ-2120-V-6;
PB-180 125
Final technical report.

A study to gether and measure data on vehicle movement and interaction from which driver behavior patterns could be inferred and used for both input and validation of an urban intersection model. Two intersections in New York State were observed over a period of two years by two different data collection procedures. Photographic observation was done from a light plane. This method was found to be useful in low traffic volume surveys where quick response was required. It provided data on gap acceptance, driver response to stop signs vs. flashing red or yellow lights, and speed approaching and passing through an intersection.

2/9 Traffic Control (Cont.)

HS-004-876 (Cont.)

Electronic observation was done with switches installed on the road surface and connected to recording equipment installed in a delivery van. Data were compared on a controlled and an uncontrolled road with two configurations of two-way stop and on a four-way stop. The two groups of data from the two intersections studied under the two different collection procedures are also compared.

Search terms: Intersections, Data acquisition, Driver behavior, Stop signs*, Deceleration patterns, Aerial photography*, Gap acceptance*, Speed, Electronic devices, Traffic data analysis, Urban intersections*

AVAILABILITY: From CFSTI as PB-180 125

HS-004 877 Fld. 2/9,3/4,4/5

URBAN INTERSECTION STUDY. VOL. 7, RESOURCES ON DRIVER BEHAVIOR: ABSTRACTS by Richard A. Raub, ed. Cornell Aeronautical Lab., Inc., Buffalo, N. Y.

Sep 1968 100p
Contract CPR-11-2856
Report no. CAL-VJ-2120-V-7;
PB-180 126

Final technical report.

An annotated bibliography of over 100 publications on traffic and driver behavior, oriented to intersection studies. Entries are arranged in four categories: Traffic flow and gap acceptance, Information processing and driving behavior, Simulation, Miscellaneous.

Search terms: Intersections, Traffic data analysis, Bibliographies, Driver behavior, Traffic flow, Gap acceptance*, Data processing, Computerized simulation, Simulation, Urban intersections*

AVAILABILITY: From CFSTI as PB-180 126

HS-004 887 Fld. 4/8,2/9

THE AUTOMATIC HIGHWAY by George R. Bierman, John L. Hain

Published in Mechanical Engineering v90 n7 p18-21 (Jul 1968)

Incorporates privately owned vehicle into a controlled mass transit system, Urban Highway Mass-Transit (UHMT). Vehicle must be electric to accommodate control of vehicle and roadway speed, steering control, entrance and exit procedures, automatic checkout, etc.

Search terms: Automatically guided automobiles, Electric automobiles, Automatic highways, Mass transportation, Commuting patterns, Electronic traffic control, Controlled access highways

HS-004 922 Fld. 1/3,5/2,2/9

INTERSTATE BUS--AUTOMOBILE COLLISION, INTERSTATE ROUTE 15, BAKER, CALIFORNIA, MARCH 7, 1968. HIGHWAY ACCIDENT REPORT
National Transportation Safety Board, Washington, D.C.

18 Dec 1968 78p
Report no. SS-H-3

Auto driver under the influence of alcohol and carbon monoxide was driving the wrong way on a freeway and ran head on into a bus, which overturned. The auto driver and 19 persons on the bus died as both vehicles were gutted by fire. The bus fire spread so rapidly that persons in the center could not escape. There was no traffic control device to warn the auto driver that he was going the wrong way.

Search terms: Accident causes, Head on collisions, Drinking drivers, Driver intoxication, Carbon monoxide, Traffic control

devices, Bus accidents*, Fires, Automobile accidents, California*, Driver characteristics, Wrong way*, Interstate highway system, Accident reports, Blood alcohol levels*, Accident causes, State laws, Federal regulations*, Accident investigation, Injuries, Fatalities, Case reports*

AVAILABILITY: From corporate author

HS-004 927 Fld. 1/4,2/9

ACCIDENTS AT RURAL THREE-WAY JUNCTIONS by M. G. Colgate, J. C. Tanner
Road Research Lab., Crowthorne, Berks. (England)

1967 33p 9 refs
Report no. RRL-LR-87

This report deals with the effect of layout and traffic flow on the frequency of 'junction' type accidents. Results confirm those of earlier investigations: (1) frequency varies with square root of product of the two flows; (2) accident rates for the right corner are highest at left-hand splays, while rates for left corners are highest at square junctions.

Search terms: Accident rates, Accident locations, Rural areas, Intersections, Turning (direction change), Highway design, Mathematical analysis, Turning left, Traffic flow, Traffic control devices, Statistical analysis, Turning right

AVAILABILITY: From corporate author

HS-004 934 Fld. 2/5,2/9

LIGHTING HIGHWAY SIGNS: THE USE OF MERCURY LAMPS. PROGRESS REPORT by Richard Mollin

Published in Illuminating Engineering v62 n2 p115-20 (Feb 1967) 6 refs

Mercury sign-lighting was

2/9 Traffic Control (Cont.)

HS-004 934 (Cont.)

compared with standard fluorescent lighting (photometrics, mechanics, and economics). The mercury system has the flexibility needed to cope with the higher signs now coming into use on highways.

Search terms: Fluorescent lamps*, Mercury lamps*, Highway signs, Lighting design, Photometry, Traffic signs, Poles (supports), Costs*

HS-004 937 Fld. 2/9

COLOR IN TRAFFIC CONTROL
by Carlton C. Robinson

Published in Traffic Engineering v37 n8 p25-9 (May 1967) 24 refs

Color is the most important element in the code through which traffic control devices convey meaning to drivers. A color code is suggested which is an extension of the present practice. Six colors are assigned meanings consistent with traditional use. Three others are given new uses and three more reserved for future uses. Practicality of the code is yet to be tested. Usage for each color is outlined.

Search terms: Traffic control devices, Signal color, Signs (displays), Traffic signs

HS-004 938 Fld. 2/9

A COMMENTARY ON TRAFFIC SURVEILLANCE SYSTEMS AND TECHNIQUES
by Morton I. Weinberg

Published in Traffic Engineering v37 n6 p24-7 (Mar 1967)

There appear to be no breakthroughs in sight to help the traffic engineer determine what traffic is doing. Small improvements are possible with present equipment. Weapons and spac

systems engineering are too remote to be helpful. Even a small city's traffic would saturate any battle control system in use today, assuming that the same procedures were possible for controlling each vehicle. Types of present traffic surveillance devices, especially photography and television, are discussed.

Search terms: Traffic engineering, Photography, Television systems, Traffic control, Motor vehicle control, Traffic flow

HS-004 939 Fld. 2/9

CRITICAL LAG IN AT-GRADE INTERSECTIONS
by Jens Rorbech

Published in Traffic Engineering & Control v8 n8 p500-1 (Dec 1966)

In estimating traffic flow for turning cars at unsignalized intersections, it is important to know the time lag in the main street traffic which side street traffic finds necessary in order to enter the intersection. The influence of speed of the main traffic flow and of right-of-way regulations on time lag at T-intersections is discussed. Study was made in Copenhagen.

Search terms: Intersections, Traffic flow, Time factors*, Traffic estimates, Turning (direction change), Speed, Right-of-way (traffic rules)*, Denmark*

HS-004 940 Fld. 2/9

EXPERIMENTAL STUDIES IN VEHICLE AUTOMATIC LONGITUDINAL CONTROL
by James G. Bender
Ohio State Univ., Columbus.
Engineering Experiment Station

Aug 1968 95p 13 refs
Report no. EES-276A-5

Substantial improvement in high-speed, high-density flow can be achieved by highway automation. A vehicle automatic longitudinal control

system was tested in various lead-car overtaking and car-following situations. An examination of the resulting data shows that this system can safely, efficiently, and comfortably control a vehicle. Experimental results corresponded to those predicted from theoretical and simulator studies.

Search terms: Traffic flow, Automatic highways, Automatically guided automobiles, Following distance, Overtaking (driving), Traffic density, High speed

AVAILABILITY: From corporate author

HS-004 941 Fld. 2/9

METHODS OF SIGNALIZING LEFT-TURN MOVEMENTS AT CHANNELIZED INTERSECTIONS
by Barry W. Fairfax

Published in Traffic Engineering v37 n8 p48-50,52-4 (May 1967)

The type of traffic signal that will convey to a driver that he may turn left but must yield to opposing traffic was studied. The devices tested were full green ball, flashing amber ball, and flashing red ball. Test results are outlined. Flashing amber indication is recommended for intersections with 2-phase mode operation, left turn channelization, lane control signals, or driver option left turn signals.

Search terms: Signal color, Turning left, Traffic signals, Traffic control, Intersections Traffic lanes

HS-004 942 Fld. 2/9

RAMP METERING CONTROL SYSTEM
by Alan F. Barney

Published in Public Safety Systems p11-13 (Nov-Dec 1968)

Describes gap-acceptance system for controlling freeway entrance ramps. Waiting

2/9 Traffic Control (Cont.)

HS-004-942 (Cont.)

vehicles are released at the correct time to enable them to merge into gaps in traffic. System components are: vehicle detectors to monitor traffic movement, control equipment to analyze the information from detector, ramp signals, and displays showing the traffic picture to the traffic engineer. Problems are setting up a system of priority and releasing waiting lines of cars when traffic is heavy.

Search terms: Ramps, Gap acceptance*, Traffic signals, Traffic flow patterns, Merging traffic, Peak hour traffic, Traffic engineering, Access control, Freeways, Controlled access highways, Electronic traffic control

HS-004 965 Fld. 2/9,3/4

AN INVESTIGATION OF DRIVER-AIDED CAR FOLLOWING
by William B. Montano,
Robert E. Fenton
Ohio State Univ., Columbus.
Engineering Experiment
Station

Nov 1967 128p 18 refs
Report no. EES-276A-2

A driver's inability to detect small relative velocities and small errors in headway is a primary reason for his poor car-following performance. This can be greatly improved if he is given information concerning headway and relative velocity of a lead car. A control stick with a built-in kinesthetic tactile display was tested in a car-following situation and performances compared to those when no aid was used. Sizable reductions in velocity variance and headway variance were obtained when aid was used.

Search terms: Automobile simulators, Velocity,

Following distance,
Traffic flow patterns,
Driver performance, Field
tests, Control sticks*

AVAILABILITY: From
corporate author

HS-004 966 Fld. 2/9

SIGNS OF THE TIMES
by Raul daSilva

Published in Highway User
p26-7 (Feb 1969)

Adequate signs for the interstate road system are an important safety measure. Missed exit signs are particularly dangerous, since motorists try to back up to exits. The cost of signs is about 2-3% of road construction costs. Signs are installed during periods when traffic is light. Manufacture of highway signs is a specialized business.

Search terms: Interstate highway system, Highway costs, Signs (displays), Safety measures, Highway signs, Traffic volume

HS-005 015 Fld. 1/4,1/3,2/9

POLICE USE OF ACCIDENT AND
VIOLATION RECORDS IN

QUEENSLAND FOR ACCIDENT
REDUCTION AND DRIVER
IMPROVEMENT PURPOSES
by R. A. Rice, J. I. Tindall

Published in Australian Road
Research Board Proceedings
of the Third Conference,
Sydney v3 pt1 p604-22 (1966)
5 refs

Report no. Paper-265
Includes discussions with
R. D. Gossip, G. Bell, and
N. S. Guerin.

To study hazardous locations so that engineering and/or enforcement measures could be taken, an Accident Analytical Section was set up by the Queensland Police Department. The Section collects traffic accident data and traffic violation reports storing the data on punched cards.

This paper details operations, data summaries, etc. generated by the system.

Search terms: Accident locations, Automatic data processing, Statistical analysis, Driver improvement, Accident prevention, Australia*, Accident analysis, Driver records, Data reduction, Law enforcement, Violations

HS-005 019 Fld. 2/5,2/9

ROAD HAZARD LAMPS
by L. C. Ellaway

Published in Traffic Engineering and Control v9 n11
p553,555 (Mar 1968) 6 refs

Discusses various types of warning beacons used in road hazard markings. Includes information on design, maintenance, and costs of paraffin road contractors' lamps, battery operated, and transistorized flashing lamps. Concludes that battery operated flashing lamps would provide maximum safety and minimum of maintenance.

Search terms: Warning systems, Lighting equipment, Flashing systems, Electric batteries, Transistors*, Markers, Hazards, Night driving, Costs*, Safety devices

HS-005 020 Fld. 2/9,2/11

DRIVER-AND-VEHICLE RESPONSE
IN FREEWAY DECELERATION WAVES
by T. W. Forbes,
Miles E. Simpson

Published in Transportation
Science v2 n1 p77-104
(Feb 1968) 9 refs

Analysis was made of speeds, time headways, distance headways, and response times as recorded by aerial photography. Incoming ramp vehicles, visible slowing ahead, and signals cause driver uncertainty. Longer average time headways were found after deceleration waves; this is important for

2/9 Traffic Control (Cont.)

HS-005-020 (Cont.)

traffic flow theory and freeway design. All measurements were corrected by computer.

Search terms: Computers, Traffic data analysis, Traffic flow patterns, Time factors*, Reaction time, Ramps, Speed, Aerial photography*, Deceleration patterns, Freeway planning, Traffic signals, Traffic density, Controlled access highways

HS-005 021 Fld. 2/9,3/4

EFFECT OF LANE-CLOSURE SIGNALS UPON DRIVER DECISION MAKING AND TRAFFIC FLOW
by Kenneth Perchonok,
Paul M. Hurst

Published in *Journal of Applied Psychology* v52 n5 p410-3 (1968) 7 refs

A decision-theoretic model was applied to driver behavior on an urban expressway. The model permits inferential measurement of responsiveness versus confusion and of risk-taking predisposition. These variables, in addition to risk taking and hazard, were measured in a field study of forced merging from a blocked lane. Results were compared under two methods of lane closure: signal closure, which provides earlier warning, and conventional closure. The signal closure method was superior in lower hazard, greater responsiveness, and traffic flow characteristics.

Search terms: Driver behavior, Traffic control devices, Traffic lanes, Reaction time, Hazards, Traffic flow, Merging traffic, Urban highways, Traffic signals, Decision theory*, Driver behavior

HS-005 022 Fld. 2/9

PROPERTIES OF VEHICLE-ACTUATED SIGNALS: I. ONE-WAY STREETS
by Gordon F. Newell

Published in *Transportation Science* v3 n1 p30-52 (Feb 1969) 19 refs

Fluid and diffusion queueing approximations are used to analyze the behavior of vehicle-actuated signals at the intersection of two one-way streets with no turning traffic. To minimize delay the signal should switch as soon as the queue vanishes. Cycle and delay time are analyzed.

Search terms: Queueing theory*, Intersections, One way streets, Traffic signals, Traffic data analysis, Time factors*, Traffic flow patterns, Statistical analysis, Traffic actuated signals*

HS-005 060 Fld. 2/9

CAPACITY OF PRIORITY INTERSECTIONS

by R. J. Salter

Published in *Traffic Engineering & Control* v10 n3 p134-6, 140 (Jul 1968)

Priority control is one of the most widely used means of resolving conflicts between crossing and merging vehicles at highway intersections. Investigations concerning the average delay to minor road vehicles and hence the practical capacity of the intersection are described.

Search terms: Intersections, Traffic flow patterns, Mathematical models, Traffic control, Traffic density, Traffic simulation

HS-005 061 Fld. 2/9

CENTRALISED COMPUTER CONTROL OF TRAFFIC SIGNALS. REPORT FROM MUNICH

by Gerhard Pavel

Published in *Traffic Engineering & Control* v9 n5 p232-6 (Sep 1967) 9 refs

Traffic signal systems can raise the traffic output at intersections, enhance safety, facilitate orderly flow. Some of the problems and operating methods for traffic data processing systems using electronic computers

are noted. Special reference is made to the system first installed in Berlin.

Search terms: Traffic signals, Traffic control devices, Computers, Electronic traffic control, Traffic flow patterns, Traffic simulation, Europe*, Canada*, United States*, Traffic counters*, Detectors, Time factors*, Traffic control systems*, Television systems, Traffic signal networks*

HS-005 062 Fld. 2/9

CHOICE OF OFFSETS IN LINKING TRAFFIC SIGNALS

by R. E. Allsop

Published in *Traffic Engineering & Control* v10 n2 p73-5 (Jun 1968)

When neighboring intersections in a network of roads are controlled by traffic signals, delay can be reduced by linking the signals. A "combination method" is described for timing signals, and computer programs for it are discussed. Data required for using this method are outlined.

Search terms: Intersections, Traffic signals, Computer programs, Time factors*, Traffic control devices, Traffic signal networks*

HS-005 063 Fld. 2/9

THE EFFECT OF THE DIRECTIONAL DISTRIBUTION ON THE CAPACITY OF TWO-LANE TWO-WAY ROADS

by P. W. Casey, J. I. Tindall

Published in *Australian Road Research Board Proceedings of the Third Conference, Sydney* v3 pt1 p488-514 (1966)

Report no. Paper-284

Effects of directional distribution are analyzed, particularly when the flow in the major direction is substantially greater than in the minor direction. Analysis was also made to determine the effect of directional distributions of traffic on speed distribution and overtaking on a straight level stretch of road. A long-term objective of this work is to increase the level of service provided by two-lane highways.

Search terms: Traffic data analysis, Two lane highways, Speed pat-

2/9 Traffic Control (Cont.)

HS-005-063 (Cont.)

terms, Overtaking (driving), Traffic flow patterns

HS-005 064 Fld. 2/9, 4/7

GAP ACCEPTANCE CHARACTERISTICS FOR RAMP-FREEWAY SURVEILLANCE AND CONTROL

by Donald R. Drew

Texas A and M Univ., College Station. Texas Transportation Inst.

Published in *Highway Research Record* n157 p108-43 (1967)

Gap acceptance and merging delay characteristics were studied for six entrance ramps. Merging vehicles were divided into two groups, those which accepted the first gap and those which accepted a later gap. Based on a queueing model, a ramp metering technique was developed. Need exists for an automatic ramp control technique.

Search terms: Gap acceptance*, Queueing theory*, Merging traffic, Time factors*, Ramps, Freeways, Traffic control, Traffic surveys, Mathematical analysis

HS-005 065 Fld. 2/9, 2/4

ROAD MARKINGS AS AN AID TO TRAFFIC MOVEMENT

by F. M. Hale

Published in *Traffic Engineering & Control* v9 n1 p57-8, 60 (May 1967)

The main classes of road marking used to control traffic movement in Great Britain are: longitudinal, transverse, worded and box, and junction markings. Possible future requirements resulting from changing traffic conditions are considered.

Search terms: Traffic markings, Great Britain*, Traffic flow, Traffic control

HS-005 066 Fld. 2/9

TRAFFIC SIGNALS: SATURATION FLOW AND LOST TIME

by E. Grant, A. D. Simpson

Published in *Traffic Engineering & Control* v9 n7 p344-5 (Nov 1967)

Describes a method and apparatus used to carry out simultaneous classified counts of four traffic streams on an approach to a signal-controlled intersection. Data collected can be used to calculate saturation flows and lost times. Four classifications of vehicles recorded during this test: motorcycles, cars, trucks and buses.

Search terms: Intersections, Traffic flow patterns, Traffic signals, Traffic data analysis, Measuring instruments, Motorcycles, Automobiles, Trucks, Buses (vehicles), Traffic capacity, Time factors*

HS-005 067 Fld. 2/9, 4/1

TRAFFIC CONTROL DEVICES—LIABILITY IN ILLINOIS FOR FAILURE TO PROPERLY INSTALL AND MAINTAIN

by Lester A. Bonaguro

Published in *Traffic Digest & Review* v17 n2 p18-24 (Feb 1969)

Failure to install traffic control devices properly and maintain them can result in liability on the part of the state, local governmental units, and government employees. The importance of traffic control devices in the movement of traffic and the reliance placed upon them by drivers should make traffic engineers more aware of their responsibility to the public. Points of law involved with these devices are outlined.

Search terms: Legal factors, Traffic control devices, State government, Local government*, Driver behavior, Traffic flow, Traffic engineering, Illinois*, Negligence*, Liability*, State laws

HS-005 079 Fld. 4/8, 2/9

TECHNICAL PROBLEMS OF URBAN TRAFFIC CONTROL

by D. J. Lyons

Published in *Traffic Engineering & Control* v9 n1 p31-4, 39 (May 1967)
5 refs

The degree of congestion and delay in an urban road network depends on

the traffic demand in relation to the traffic capacity. Control is possible through: parking restrictions, road pricing, diversion and advisory signalling, construction of new roads, smaller cars for cities, direct control of traffic movement (traffic signals).

Search terms: Highway design, Urban areas, Traffic planning, Traffic signal networks*

HS-005 106 Fld. 2/9

STANDARDIZATION OF ROAD SIGNS IS ESSENTIAL TO TRAFFIC SAFETY

Anonymous

Published in *SAE Journal* v77 n3 p37-9 (Mar 1969)

Use of nonstandard road signs is a threat to traffic safety. The following aspects of this problem are discussed: the national scene (only about one-half of the road signs comply with these standards), international practice, and worldwide standards.

Search terms: Traffic safety, Standards, Hazards, Traffic signs, Highway signs

HS-005 107 Fld. 2/9, 4/8

COMPARATIVE ANALYSIS OF TRAFFIC ASSIGNMENT TECHNIQUES WITH ACTUAL HIGHWAY USE

by Matthew J. Huber, Harvey B. Boutwell, David K. Whiteford

Yale Univ., New Haven, Conn. Bureau of Highway Traffic

1968 95p 36 refs
Report no. NCHRP-58; NAS-NRC Pub-1712

Research sponsored by AASHO in cooperation with BPR.

Study was undertaken to compare accuracy of predicted use with actual use and to prepare a plan for further testing of forecasting and assignment procedures, including development of measures of change in traffic patterns of a network brought about by a new facility.

Search terms: Traffic data analysis, Statistical analysis, Traffic flow patterns, Highway usage, Forecasting, Road networks*, Highway planning, Connecticut*

2/9 Traffic Control (Cont.)

HS-005-107 (Cont.)

AVAILABILITY: HRB \$3.60

HS-005 108 Fld. 2/9

EVALUATION OF ENTRANCE RAMP CONTROL ON A SIX-MILE FREEWAY SECTION

by Charles Pinnell, Donald R. Drew, William R. McCasland, Joseph A. Wattleworth

Texas A and M Univ., College Station. Texas Transportation Inst.

Published in *Highway Research Record* n157 p22-67 (1967) 8 refs

Presented at 45th Annual Meeting, HRB.

Some of the entrance ramps were closed during morning rush hour to improve traffic flow. The experiment was successful in cutting congestion and decreasing travel time. Traffic flow is analyzed.

Search terms: Peak hour traffic, Traffic flow patterns, Traffic data analysis, Traffic congestion, Travel time, Freeways, Ramps, Traffic control, Traffic signs, Traffic signals

HS-005 109 Fld. 2/9

MERGING BEHAVIOR AT FREEWAY ENTRANCE RAMPS: SOME ELEMENTARY EMPIRICAL CONSIDERATIONS

by R. D. Worrall, D. W. Coutts, H. Echterhoff-Hammerschmid, D. S. Berry

Northwestern Univ., Evanston, Ill. Dept. of Civil Engineering

Published in *Highway Research Record* n157 p77-107 (1967) 62 refs

Presented at 45th Annual Meeting, HRB.

Discusses an elementary empirical analysis of merging behavior, particularly gap acceptance and rejection behavior at a freeway entrance ramp. No attempt is made to develop a theory of merging or to validate existing analytical or simulation models. Emphasis is placed on improved analytical methodology and on the collection of data useful as

input to future theoretical studies or in design of a freeway control system. Ability to distinguish between the factors which influence merging has implications for the design and operation of freeway control systems.

Search terms: Driver behavior, Gap acceptance*, Traffic control, Ramps, Freeways, Merging traffic, Data acquisition, Traffic data analysis, Simulation models, Statistical analysis

HS-005 110 Fld. 2/9

A SCHOOL BUS OWNER LOOKS AT RAILROAD GRADE CROSSINGS

by Robert H. Paradise

Published in *School Bus Fleet* v14 n2 p18-20 (Apr-May 1969)

Discusses the reasons why crossings are dangerous, such as inadequate warning time and driver chance-taking. Suggests that an electronic device is needed in school buses to warn the driver of the presence of a train before he can see it.

Search terms: Railroad grade crossings*, School buses, Bus drivers, Warning systems, Electronic devices, Reckless driving

HS-005 111 Fld. 2/9

DEVELOPMENT OF AN EFFECTIVE RUMBLE STRIP PATTERN

by Wesley R. Bellis

Published in *Traffic Engineering* v39 n7 p22-5 (Apr 1969)

The use of rumble strips directs the attention of motorists to unusual traffic conditions. Types of sites suitable for rumble strip installation are discussed. It is recommended that advance notice be given the motorist that he is approaching rumble strips, that a series of strip patterns may be better than one, that strips should be installed on more than one of the roads in dangerous intersections, that driving around the strips should be prevented, and that proper distance should be used between the warning device and the critical area.

Search terms: Rumble strips*, Warning systems, Traffic control

devices, Intersections, Highway planning, Accident prevention

HS-005 112 Fld. 2/9

THE MEASUREMENT OF HIGHWAY TRAFFIC PERFORMANCE

by Bruce D. Greenshields

Published in *Traffic Engineering* v39 v7 p26-30 (Apr 1969)

Describes a traffic systems analyzer to measure the three basic factors of traffic stream flow—average speed, change of speed, change of direction. From these data a "traffic number" may be derived to characterize traffic motion.

Search terms: Traffic data analysis, Speed, Traffic flow patterns, Systems analysis, Turning (direction change), Travel time

HS-005 113 Fld. 2/9

THE DETERMINATION OF PRIORITIES AT CONTROLLED AND UNCONTROLLED INTERSECTIONS—RIGHT OF WAY

by C. Cameron

Published in *Australian Road Research* v3 n6 p38-41 (Jun 1968) 8 refs

The concept of priorities implied in the law is examined in the light of what is already known about the operation of the law and about driver behavior in the type of situation the law is intended to resolve. Further study is suggested to determine whether the present law, which requires giving way to the right, is inadequate.

Search terms: Right-of-way (traffic rules)*, Traffic laws, Driver behavior, Australia*, Gap acceptance*

HS-005 114 Fld. 2/9

DELAYS TO TRAFFIC PLATOONS

by D. J. Buckley, J. A. Tomlin, W. G. a'B. Minson

Published in *Australian Road Research Board Proceedings of the Third Conference, Sydney* v3 pt1 p364-76

(1966) 9 refs

Report no. Paper-282

2/9 Traffic Control (Cont.)

HS-005-114 (Cont.)

Study is made of delays to an idealized traffic platoon passing through a fixed-time traffic signal. Delay patterns are identified by sets of inequalities on the cycle and phasing of the signal and the arrival time and duration of the platoon. A delay function corresponds to each set of inequalities. The work may be applied to comparison by computer of alternative signal settings for a street system.

Search terms: Traffic flow patterns, Traffic signals, Time factors*, Computers, Traffic control, Traffic signal networks*, Intersections, Mathematical analysis*

HS-005 115 Fld. 2/9, 4/7

DELAYS CAUSED BY RIGHT-TURNING VEHICLES

by D. H. Reid

Published in *Transportation Science* v2 n2 p160-71 (May 1968)

Presents a mathematical model for behavior of right-turning vehicles at an uncontrolled intersection on a two-lane major road with a minor road, vehicles on the major road having absolute priority. Random

HS-005 116 Fld. 2/9, 2/4

DESIGN OF SIGNAL-CONTROLLED TRAFFIC JUNCTIONS ALLOWING FOR RIGHT TURN MOVEMENT

by H-K Lam

Published in *Journal of the Institution of Highway Engineers* v14 n8 p23-7 (Aug 1967)

Describes a method of traffic control in which the usual channelizing island in the middle of the junction, while retaining its original function, is converted into an area for temporary storage of right-turn traffic. Traffic moves into this storage island in the first phase and is released on the second. Traffic cuts and merging of different traffic streams are thereby eliminated. Several design examples

are discussed. Study deals with British traffic conditions

Search terms: Traffic control, Turning right, Merging Traffic, Intersections, Highway design, Turning lanes*, Great Britain*

HS-005 154 Fld. 2/9

CLASSIFICATION AND APPLICATION OF TRAFFIC PROBLEMS BY MODELS

by Donald R. Drew

Published in *Traffic Engineering* v36 p23-4, 43 (Nov 1965)

By establishing performance standards for evaluating traffic operations, it should be possible to improve highways and traffic control devices to achieve better traffic flow. Both physical and theoretical models are defined. Traffic variables are outlined and the freeway merging process described.

Search terms: Traffic control devices; Traffic flow; Highway planning; Traffic data analysis; Merging traffic; Variables*; Mathematical models

HS-005 155 Fld. 2/9

WORK SITE PROTECTION REQUIRES TIMELY COMMUNICATION

Anonymous

Published in *Public Works* v99 n12 p65-6 (Dec 1968)

Discusses traffic control devices for use around construction sites. Cautions contractors that the use of barriers alone is insufficient, as they will not stop a speeding car. Warning devices need to be posted far enough in advance of the work site to permit vehicles to slow down; signs and flags should be high enough to be seen by all drivers in a line of vehicles. Markers should also be placed to guide motorists, and workmen should wear bright protective clothing.

Search terms: Traffic control devices; Barriers; Warning systems; Signs (displays); Protective clothing*; Construction sites*

HS-005 156 Fld. 2/9

COMPARISON OF THE PERFORMANCE AND ECONOMY OF HOT-EXTRUDED THERMOPLASTIC HIGHWAY STRIPING MATERIALS AND CONVENTIONAL PAINT STRIPING

by Bernard Chaiken

Bureau of Public Roads, Washington, D.C. Office of Research and Development

Published in *Public Roads* v35 n6 p135-56 (Feb 1969) 14 refs

Thermoplastic was found more economical under high traffic density and limited snowplow activity; bituminous pavements showed thermoplastics to better advantage than concrete surfaces. Selection parameters include traffic density, pavement type, and mean annual snowfall. Specifications and costs are included.

Search terms: Specifications; Paints; Traffic markings; Thermoplastics*; Materials tests; Costs*; Traffic density; Snow removal; Concrete pavements; Bituminous concretes

HS-005 157 Fld. 2/9; 3/4

ESTIMATING MINIMUM GAP ACCEPTANCES FOR MERGING MOTORIST

by D. R. McNeil; J. H. T. Morgan

Published in *Transportation Science* v2 n3 p265-77 (Aug 1968) 5 refs

Equations are used to estimate the minimum gap distribution a driver will accept before attempting to cross or turn into a through street. Data obtained from an intersection offer a numerical analysis. Study is of value in determining stop sign placement.

Search terms: Merging traffic; Intersections; Turning (direction change); Mathematical models; Traffic flow; Stop signs*; Driver behavior; Gap acceptance*; Time factors*

HS-005 158 Fld. 2/9

SOME ASPECTS OF TRAFFIC SIGNAL CONTROL

by J. M. Bayley

Published in *Australian Road Re-*

HS-005-158 (Cont.)

search v2 n3 p23-39 (Mar 1965)

Describes problems relating to the use of 166 signal installations in Melbourne. Discusses types of equipment used, coordination and timing of signals, pedestrian, control, channelization, and public transport aspects.

Search terms: Traffic signals; Australia*; Traffic control devices; Pedestrian safety; Public transportation; Traffic lanes; Traffic actuated signals*; Traffic signal networks*; Scramble*

HS-005 159 Fld. 2/9

OPTIMIZING A LOCAL STREET SYSTEM BY SIMULATION

by Nikolaos Voskoglou, Robert J. Wheeler

Published in *Traffic Quarterly* v23 n2 p179-96 (Apr 1969) 21 refs

Traffic flow and its characteristics can be simulated by using the GPSS (general purpose simulation system) computer language. This study predicts the peak flow from parking facilities on the University of Missouri campus, where other land uses preclude major changes in the street system.

Search terms: Traffic flow; Computerized simulation; Urban areas; Land use; Missouri*; Parking; GPSS (programming language)*; Traffic simulation; Streets; Peak hour traffic

HS-005 214 Fld. 2/9

THE TIME TO DRIVE THROUGH A NO-PASSING ZONE

by Vincent Hodgson

Florida State Univ., Tallahassee

Published in *Transportation Science* v2 n3 p252-64 (Aug 1968)

Contract NONR-988(08); FH-11-6680

A no-passing zone is a one-line, one-way highway with one entrance and one exit. Cars build up to form a platoon which then behaves like

individual cars. Models are derived for the distribution of gap in time between leaving the zone and of the number of cars found in the platoon.

Search terms: Mathematical models; Passing (driving); One way streets; Queueing theory*; Traffic flow; Travel time; Time factors*; Gap acceptance*; Following distance

HS-005 215 Fld. 2/9

GAP-ACCEPTANCE IN ROAD TRAFFIC

by A. G. Hawkes

Published in *Journal of Applied Probability* v5 n1 p84-92 (Apr 1968) 10 refs

Statistical analysis on distribution of delay to minor road vehicles waiting to merge or cross a single stream of major road traffic. The decision to cross is taken on the basis of a gap-acceptance function. The model turns out to be a simple queueing problem in which a customer finding an empty queue has a different service time distribution from queueing customers. Numerical results are given.

Search terms: Merging traffic; Queueing theory*; Statistical analysis; Gap acceptance*; Traffic flow patterns; Models; Driver behavior; Time factors*

HS-005 216 Fld. 2/9

MOVEMENT OF VEHICLES FROM A STATIONARY QUEUE

by J. A. Ferguson

Published in *Traffic Engineering and Control* v9 n8 p388-91,97 (Dec 1967) 9 refs

Investigation of the change in distribution of platoons as they are released from a traffic signal and methods by which delay may be minimized for traffic in one and two way linked systems, by synchronization of signals.

Search terms: Traffic signals; Traffic flow patterns; Traffic systems; Time factors*; Overtaking (driving); Queueing theory*; Traffic data analysis

HS-005 217 Fld. 2/9

THE DESIGN OF AUTOMATIC

SURVEILLANCE SYSTEMS FOR URBAN FREEWAYS

by Stanley M. Altman; Louis Pignataro; Harry N. Yagoda

Published in *Transportation Research* v2 p347-61 (1968) 17 refs

Based on 1967 Ph. D. thesis by S.M.A. to Polytechnic Institute of Brooklyn.

Traffic flow on highways can be improved through the use of electronic traffic aids. Information obtained would describe behavior of traffic stream, and could also be used to determine how the data-handling system should be modified as the statistics of the traffic stream change. Optimization algorithm can be used in designing a surveillance and control project or in evaluating the effectiveness of existing systems. Stochastic processes are also used.

Search terms: Detectors; Urban highways; Electronic traffic control; Algorithms; Data processing; Optimization*; Stochastic processes*; Traffic flow; Traffic data analysis; Freeways; Traffic systems; Traffic surveillance

HS-005 218 Fld. 2/9

THE SIGN ALONG THE HIGHWAY

by John Lees; Melvin Farman

Published in *Traffic Digest and Review* v17 n3 p3-7 (Mar 1969)

Reprinted from the Mar-Apr 1968 special issue of *Print*.

Brief history of the development of road sign signal system used in the United States and highlights in chart form major systems currently in use throughout the world. Covers problems pertaining to establishment of comprehensive international road sign system. Includes United Nations standards for signs.

Search terms: Traffic signs; United States*; United Nations*; Signs (displays); Standards

HS-005 219 Fld. 2/9

EVALUATION OF THE CONFLICT HAZARD OF UNCONTROLLED JUNCTIONS

by M. Peleg

2/9 Traffic Control (Cont.)

HS-005-219 (Cont.)

Published in *Traffic Engineering and Control* v9 n7 p346-7 (Nov 1967)

Covers methods used to determine when an uncontrolled intersection warrants some type of traffic control because of traffic volume, speed patterns, and accident hazards.

Search terms: Peak hour traffic; Traffic volume; Traffic control; Intersections; Accident factors; Accident risks; Speed patterns; Hazards

HS-005 220 Fld. 2/9; 4/7

A SENSITIVITY ANALYSIS OF EMPIRICALLY DERIVED CAR-FOLLOWING MODELS

by Thomas H. Rockwell; Ronald L. Ernst; Albert Hanken

Ohio State Univ., Columbus

Published in *Transportation Research* v2 p363-73 (1968) 8 refs

Purpose of this study was to examine the sensitivity of empirically derived car-following models to time delays on predictor variables, lead-car velocity programs, subjects, and replications within subjects. Regression models are illustrated and conclusions discussed.

Search terms: Car following*; Time factors*; Speed; Traffic data analysis; Regression analysis*; Statistical analysis; Computerized simulation; Driver-vehicle interface; Simulation models; Road tests

HS-005 221 Fld. 2/9

DAIR—A NEW CONCEPT IN HIGHWAY COMMUNICATIONS FOR ADDED SAFETY AND DRIVING CONVENIENCE

by E. A. Hanyasz; C. E. Quinn; J. E. Stevens; W. G. Trabold

General Motors Research Labs., Warren, Mich.

Published in *IEEE Transactions on Vehicular Technology* vVT-16 n1 p33-45 (Oct 1967)

Presented at IEEE Vehicular Group

Conference, Montreal, Dec 1966.

Describes a driver aid system called DAIR (Driver Aid, Information, and Routing) which relieves driver of burden of scanning roadside for traffic signs and of obtaining emergency service or information. The system includes (1) two-way voice and coded communications between the vehicle and aid and information centers, (2) audio sign for reception, (3) visual sign minder and (4) route minder.

Search terms: Automatically guided automobiles; Driving tasks; Highway communication; Emergency services; Radio communication*; Traffic signs; Routes; Automatic control; Driver aid, information, and routing system*

HS-005 222 Fld. 2/9; 4/7

TRAFFIC DYNAMICS: CAR FOLLOWING STUDIES

by T. Constantine; A. P. Young

Published in *Traffic Engineering and Control* v8 n9 p551-4 (Jan 1967) 7 refs

Car following theories are briefly described, an experimental technique developed for testing the theories under actual traffic conditions is illustrated. Spacing and relative velocity are obtained photographically.

Search terms: Mathematical models*; Traffic flow; Photography; Car following*; Traffic data analysis; Speed; Gap acceptance*

HS-005 223 Fld. 2/9

SIMULATION OF TRAFFIC BEHAVIOR THROUGH A LINKED-PAIR OF INTERSECTIONS

by S. Saleeb; M. G. Hartley

Published in *Transportation Research* v2 n1 p51-61 (Mar 1968) 7 refs

Steady-state simulations showed effect of different traffic parameters on the mean delay and mean queue length at intersections. These parameters include offset between two traffic signals, degree of saturation, extraction rate, and input flow rate. A variety of simulations of traffic behavior through two fixed-time signal-controlled intersections are described.

Search terms: Traffic density; Peak hour traffic; Traffic flow; Computerized simulation; Mathematical models; Queueing theory*; Traffic signals; Intersections; Traffic simulation

HS-005 224 Fld. 2/9

THEY'RE BRIGHTER IF THEY FLOAT

Anonymous

Published in *Better Roads* v39 n4 p28-30 (Apr 1969)

Reflective glass traffic beads are mixed with paint to improve visibility of road stripes at night. Small, uniformly graded traffic beads are found superior in both brightness and durability. Estimated cost savings were approximately \$50,000 for the 1967-68 striping season.

Search terms: Traffic markings; Brightness; Visibility; Colorado*; Paints; Performance tests; Night driving; Costs*; Glass beads*; Reflecting surfaces

HS-005 225 Fld. 2/9; 4/7

REFINEMENT AND TESTING OF URBAN ARTERIAL AND NETWORK SIMULATION

by Frederick A. Wagner, Jr.; Frank C. Barnes; Daniel L. Gerlough

Planning Research Corp., Los Angeles, Calif.

Nov 1967 197p 17 refs

Contract CPR-11-2806

Report no. PRC-R-1064; PB-177 605

A digital computer simulation model of traffic operation and control on urban arterials and networks was tested in Los Angeles traffic conditions. Improvements in the simulation model included refinement of pedestrian-vehicle conflicts at signalized intersections, platoon dispersion logic using variability of vehicle speeds and passing behavior, refinement of queue discharge logic, traffic responsive signal control techniques, and modified format. Statistical analyses substantiated the inherent realism of the model. The model used was TRANS (traffic network simulation model).

Search terms: Passing (driving); Driver behavior; Urban highways; Statistical analysis; Traffic simu-

2/9 Traffic Control (Cont.)

HS-005-225 (Cont.)

lation; Computer programs; Traffic control devices; Pedestrian-vehicle interface; Queueing theory*; Digital computers; Simulation models; Traffic control; Los Angeles*; Intersections; Speed patterns

AVAILABILITY: CFSTI as PB-177 605

HS-005 241 Fld. 3/12; 2/9

OPTIMUM INTENSITY OF RED ROAD-TRAFFIC SIGNAL LIGHTS FOR NORMAL AND PROTANOPIC OBSERVERS

by Barry L. Cole; Brian Brown

Published in *Journal of the Optical Society of America* v56 n4 p516-22 (Apr 1966) 12 refs

Recognition of a red traffic signal light is most difficult when viewed against a bright sky. A laboratory simulation showed that protanopic drivers (color blindness in the red spectrum) require 4 times the normal intensity for optimum viewing.

Search terms: Signal color; Traffic signals; Visual perception; Luminance; Color blindness*; Laboratory experiments; Vision disorders*; Brightness

HS-005 242 Fld. 4/7; 2/9

MATHEMATICAL RESEARCH IN TRAFFIC FLOW

by C. William Hamilton

Published in *High Speed Ground Transportation Journal* v1 n3 p339-46 (Sep 1967) 7 refs

Part of the theory of traffic flow consists of mathematical modeling approaches to practical problems of traffic engineering. The car-following and fluid-analogy approaches are among those being rapidly expanded, and efforts are being made to combine the various modeling approaches into a single unified theory of traffic flow.

Search terms: Traffic flow; Mathematical models; Traffic engineering; Traffic systems; Car following*; Driver behavior

HS-005 270 Fld. 2/9

AN ITERATIVE APPROACH TO TRAFFIC ASSIGNMENT

by F. A. Tillman; D. K. Pai; M. L. Funk; R. R. Snell

Published in *Transportation Research* v2 n1 p63-72 (Mar 1968) 6 refs

The non-linear total travel time function is used when applying the iterative technique, which is based on the "principle of optimality" from dynamic programming, to the problem of traffic assignment. One-way and two-way traffic problems have been solved by this technique.

Search terms: Mathematical models; Traffic flow; Nonlinear programming*; Travel time; One-way streets; Traffic planning; Time factors*

HS-005 271 Fld. 2/9

ALTERNATE OFFSET DOUBLE WHITE LINES

England Ministry of Transport, London

Published in *Roads and Road Construction* v45 n532 p99 (Apr 1967)

Reports on a four-year experiment with double white lines on three-lane road. The experiment will be discontinued. At every site there was an increase in the annual rate of personal injury accidents; accident figures are given. Double white lines will still be used on hills to provide two lanes for ascending traffic.

Search terms: Accident rates; Traffic markings; Lane lines*; Injuries; Accident data; Climbing lanes*; Three lane highways*

HS-005 272 Fld. 2/9

SCHEDULING OF TRAFFIC LIGHTS—A NEW APPROACH

by Karl E. Stoffers

Published in *Transportation Research* v2 p199-234 (1968) 23 refs

Based on Ph.D. thesis at University of Fredericiana, Karlsruhe, Germany

The background of traffic light scheduling is given, and the functional relation between traffic light schedules and intersection design

is discussed. Mathematical models, linear programming, phase sequences are outlined.

Search terms: Mathematical models; Traffic control devices; Intersections; Linear programming*; Traffic signals

HS-005 273 Fld. 2/9

A CONTROL STRATEGY FOR A CONGESTED COMPUTER-CONTROLLED TRAFFIC NETWORK

by D. Longley

Published in *Transportation Research* v2 p391-408 (1968)

A traffic control strategy for urban centers subject to peak-hour traffic jams is outlined. Each controlled junction should adjust the green time split on the basis of queue length ratios. This system will respond to changes in traffic flow rates. A central computer and queue detectors are used.

Search terms: Queueing theory*; Peak hour traffic; Traffic control devices; Intersections; Traffic flow; Urban areas; Electronic traffic control; Detectors; Computers; Traffic congestion; Traffic systems

HS-005 274 Fld. 2/9

TRAFFIC SIGNAL SYNCHRONIZATION ON A ONE-WAY STREET

by E. Bavarez; G. F. Newell

Published in *Transportation Science* v1 n2 p55-73 (May 1967) 9 refs

Total delay and total number of stops are evaluated for several types of signal coordination schemes, assuming that traffic approaching the first street and all side streets is steady, and treating traffic as a fluid moving with constant velocity on the main street. It is concluded that for any cycle time there is a choice of phases that minimize delay and stops; some signal settings give less delay to the side street but more to the main street; and similar models are used to find maximum through bands for two-way traffic, but this may not be suitable for one-way streets

Search terms: Time factors*; Traffic signals; Traffic control devices; Traffic data analysis; One-way streets; Traffic flow patterns

HS-005 275 Fld. 2/9; 4/7

STABILITY OF RECIPROCAL-SPACING TYPE CAR FOLLOWING MODELS

by Ernest A. Unwin; Lucien Duckstein

Published in *Transportation Science* v1 n2 p95-108 (May 1967) 17 refs

Mathematical functions suitable to describe lead-car behavior are examined. Stability of a nonlinear car-following model is defined rigorously. Previous phase plane results show that reciprocal-spacing model is barely stable, whereas an asymptotically stable model may describe the dynamics more closely. Such a model is derived and results presented showing the relative behavior of the actual model with time delay and the proposed model

Search terms: Car following*; Mathematical analysis*; Mathematical models; Traffic dynamics; Time factors*; Traffic data analysis; Traffic flow patterns; Single lane traffic*

HS-005 276 Fld. 2/9; 4/7

ALLOCATIONS OF SERVICING PERIODS THAT MINIMIZE AVERAGE DELAY FOR N TIME-SHARED TRAFFIC STREAMS

by R. Rangarajan; R. M. Oliver

Published in *Transportation Science* v1 n2 p74-80 (May 1967)

The optimal allocation of servicing periods to a facility servicing N incoming traffic streams is determined. It is assumed that stream flows are deterministic, that there is a fixed amount of time lost when the server switches attention between traffic streams, and that the objective is to minimize time average delay

Search terms: Mathematical analysis; Traffic flow patterns; Time factors*; Traffic data analysis; Mathematical models; Traffic signals; Traffic control devices

HS-005 299 Fld. 5/4; 2/4; 2/9

AUTOMATED ROAD VEHICLES...

by Bill Firth

Published in *Automotive Design Engineering* v7 p58-9 (Nov 1968)

Outlines the Traffic Intensifying Systems (TIS) concept and sets forth seven requirements for it: that the vehicle should need no input from the road or other vehicles, should not obstruct other vehicles, that vehicle failures should affect no other vehicles, that driver should have control, that component failures should not have consequences worse than present ones, that system should allow route selection and unscheduled stops, and that system should insure use of all existing roads and permit new vehicle designs.

Search terms: Automatic highways; Automobile design; Automatically guided automobiles; Automatic control; Traffic flow

HS-005 337 Fld. 2/9

PEAK-PERIOD FREEWAY CONTROL-PLANNING AND EVALUATION

by Joseph A. Wattleworth

Texas A and M Univ., College Station. Texas Transportation Inst.

Published in *Traffic Engineering* v36 n4 p12-3, 15-8, 46, 48 (Jan 1966) 6 refs

Study of a freeway in Houston, Texas. Times of heaviest traffic were analyzed, and ramp control found to offer promise for reducing congestion and preventing bottlenecks.

Search terms: Traffic control devices; Texas*; Peak hour traffic; Ramps; Traffic congestion; Traffic data analysis; Highway planning; Controlled access highways; Freeways

HS-005 338 Fld. 2/9

STARTING RESPONSE OF TRAFFIC AT SIGNALIZED INTERSECTIONS

by Earl T. George, Jr.; Frank M. Heroy, Jr.

Published in *Traffic Engineering* v36 n10 p39, 40, 43 (Jul 1966)

Study was conducted to gain more factual information on vehicle and driver characteristics at signalized

intersections, primarily for use in timing actuated traffic signals. The time required for each vehicle in line to begin moving forward after the beginning of the green signal was measured. Seven conclusions of the study are presented, with several applications of their use in timing signals.

Search terms: Traffic signals; Time factors*; Intersections; Traffic data analysis; Traffic flow patterns; Signalized intersections*

HS-005 339 Fld. 2/9; 2/4

URBAN INTERCHANGE DESIGN AS RELATED TO TRAFFIC OPERATION. PART I-DIAMOND INTERCHANGES

by Charles Pinnell; Johann H. Buhr

Published in *Traffic Engineering* v36 n6 p20-30 (Mar 1966)

Part 2 is HS-005 326.

Discusses aspects of the diamond interchange: signal phasing, capacity, spacing of at-grade intersections, median design, turn lanes, and ramp configuration. These aspects are discussed for conventional diamond interchanges, split diamond interchanges, and three-level diamond interchanges.

Search terms: Interchanges; Intersections; Traffic signals; Traffic capacity; Medians (dividers); Traffic lanes; Ramps; Signalized intersections*; Turning lanes*

HS-005 340 Fld. 2/9

A COST ANALYSIS OF INTERSECTION TRAFFIC CONTROLS

by Charles W. Dale

Bureau of Public Roads, Washington, D.C.

Published in *Traffic Engineering* v36 n8 p45-50 (May 1966)

Warrants for intersection traffic control devices are based largely on traffic volume and accident record. This study presents a method of applying user cost data to vehicle operations

2/9 Traffic Control (Cont.)

HS-005-340 (Cont.)

and delays on two-lane highways or streets to insure that the most economic intersection control devices can be selected. Vehicle delay times and costs of accidents are analyzed. Two-way stop control is recommended as more economical than 4-way stop control.

Search terms: Traffic control devices; Intersections; Accident rates; Traffic volume; Costs*; Two lane highways; Traffic signals; Time factors*; Benefit cost analysis*; Four way stop signs*; Two way stop signs*

HS-005 341 Fld. 2/9

ROUTE CONTROL AT CRITICAL INTERSECTIONS

by D. C. Gazis; R. B. Potts

Published in *Australian Road Research Board Proceedings of the Third Conference*, Sydney v3 pt1 p354-363 (1966)

Report no. Paper-229

Capacity of a road network is often limited by the capacity of critical intersections which become bottlenecks in peak traffic conditions. A method is suggested for relieving traffic congestion at intersections by route control of traffic platoons. By using adjacent streets, the simple intersection is replaced by an intersection complex, and the control of platoons through the complex is achieved by properly coordinated traffic lights. The method is suitable for use in cities and urban areas.

Search terms: Peak hour traffic; Traffic capacity; Traffic congestion; Traffic control; Intersections; Traffic signals; Urban areas; Road networks*

HS-005 342 Fld. 2/9; 4/7

ACCELERATION NOISE AND TRAFFIC CONGESTION

by R. T. Underwood

Published in *Traffic Engineering and Control* v10 n3 p120-3, 130 (Jul

1968) 27 refs

Measurements of congestion and the related quality of traffic flow are summarized. Results of tests carried out on roads in Victoria, Australia, are reported. Acceleration noise and a related parameter (the mean velocity gradient) are compared with travel time as measures of traffic congestion. The data can be applied to transportation planning.

Search terms: Traffic congestion; Acceleration (physics); Travel time; Mathematical analysis; Speed; Australia; Traffic flow; Motor vehicle noise; Transportation planning

HS-005 343 Fld. 2/9

INSTRUMENTATION IN TRAFFIC ENGINEERING 2. VEHICLE DETECTORS AND DATA TRANSMISSION

by F. D. Hobbs; B. D. Richardson

Published in *Traffic Engineering and Control* v9 n1 p54-6 (May 1967) 5 refs

Vehicle detectors shorten the man-hour requirements for volume traffic studies. The main types are: Contact, photo-electric, infra-red, capacitive, magnetic, inductive loop, radar, ultrasonic, pneumatic. Data transmission methods and equipment are described.

Search terms: Traffic counters*; Traffic flow; Detectors; Load sensors; Data acquisition

HS-005 344 Fld. 2/9

TRAFFIC SIGNS ARE MEANT TO BE SEEN!

by Ronald W. Kostka

Published in *Optometric Weekly* v54 p1911-5 (10 Oct 1963)

Discusses kinds of signs and their purposes, standardization of signs, trends toward larger signs, overhead sign placement, use of four colors, and placement farther from the road. The night visibility of signs is an important factor.

Search terms: Traffic signs; Visibility; Signs (displays); Standardization*

HS-005 345 Fld. 2/9

SYSTEM TECHNIQUES FOR TRAFFIC CONTROL

by Edith Bairdain

Published in *Traffic Engineering* v36 n3 p11-3, 50, 58 (Dec 1965)

Describes electronic expressway and metropolitan signal control system projects under development. These are used to illustrate the types of electronic equipment available to meet traffic control needs.

Search terms: Traffic control devices; Electronic traffic control; Traffic signals; Highway planning

HS-005 346 Fld. 2/9

DETERMINING THE LENGTH OF THE APPROACH LANES REQUIRED AT SIGNAL-CONTROLLED INTERSECTIONS ON THROUGH HIGHWAYS

by Jens Roerbech

Published in *Transportation Research* v2 p283-91 (1968)

Discusses the braking of a flow of cars as a result of a shock wave beginning with the red period. The length of the queue should be defined by that part of the incoming traffic affected by the shock waves. A method is proposed for determining the length of the approach lanes required.

Search terms: Intersections; Traffic signals; Queueing theory*; Traffic flow; Traffic lanes; Braking distance

HS-005 347 Fld. 2/9; 4/7

INTENSITY OF COMMERCIAL TRAFFIC GENERATION BY INDUSTRY

by D. N. M. Starkie

Published in *Traffic Engineering and Control* v8 n9 p558-60 (Jan 1967)

The commercial vehicle has been neglected in traffic research, despite its importance. Certain hypotheses concerning commercial vehicle trip generation in Great Britain have been tested. It appears that commercial vehicle trip generation models used in transportation studies have adopted doubtful assumptions.

Search terms: Statistical analysis;

2/9 Traffic Control (Cont.)

HS-005-347 (Cont.)

Routes; Commercial vehicles; Urban areas; Transportation patterns; Traffic flow patterns; Models; Traffic data analysis; Great Britain*

HS-005 348 Fld. 2/9; 4/3

EVALUATION OF THE OPERATIONAL EFFECTS OF AN "ON-FREEWAY" CONTROL SYSTEM

by Joseph A. Wattleworth; Charles E. Wallace

Texas A & M Univ., College Station.
Texas Transportation Inst.

Nov 1967 68p 19 refs

Project NCHRP-20-3

Report no. TTI-RR-488-2

Rept. no. 2 on "Optimizing Freeway Corridor Operations through Traffic Surveillance, Communications and Control." Prepared for presentation at the 17th Annual Meeting, Highway Research Board, 15-19 Jan 1968.

Evaluates cost effectiveness of real-time traffic control systems. Research was done to determine motorists' responses to the system, the effects of the system during peak periods, and to perform a system analysis. The system consists of overhead lane control signs, overhead speed signs, and ramp closure signs. Concludes the present National Proving Ground Traffic Control System is not cost/effective; computers and detectors contributed little.

Search terms: Traffic flow patterns; Traffic control; Controlled access highways; Traffic congestion; Peak hour traffic; Benefit cost analysis*; Real time operations*; Highway signs; Computers; Detectors; Ramps; Television systems; Speed limits; Freeways; Systems analysis; Travel time; Driver behavior

AVAILABILITY: Corporate author

HS-005 349 Fld. 2/9

SPEEDS AND FLOWS OF TRAFFIC IN CENTRAL LONDON. 1. SUNDAY TRAFFIC SURVEY

by J. M. Thomson

Published in *Traffic Engineering and Control* v8 n11 p672-6 (May 1967)

The relationship between the volume of traffic and the speed at which it moves on an urban network is of great importance in transport planning. London Sunday traffic was surveyed to observe traffic speeds when flows were relatively low.

Search terms: Speed; Traffic flow; Transportation planning; Traffic data analysis; London*

HS-005 350 Fld. 2/9; 4/8

STABILITY AND STEADY STATE OF TRAFFIC PATTERNS. INTRODUCTION TO TRAFFIC SCIENCE, 2.

by W. R. Blunden

Published in *Traffic Engineering and Control* v8 n11 p677-80 (Mar 1967)
11 refs

Discusses the role of travel time in governing the performance of transportation systems and their relationship to land use. The effects of congestion on stability and performance, the connection between traffic flow and travel time, and steady state performance criteria are included. The evaluation of transport systems by economic and other means is discussed.

Search terms: Traffic flow patterns; Traffic congestion; Travel time; Queueing theory*; Economic analysis; Stability; Land use; Steady state; Transportation patterns; Performance characteristics

HS-005 351 Fld. 2/9

A SYSTEMS ENGINEERING EVALUATION AND STRUCTURE ANALYSIS OF URBAN AREA TRAFFIC CONTROLS

by Roberto Vacca

Published in *Traffic Quarterly* v23 n2 p231-41 (Apr 1969)

Performance evaluation of a traffic control system or traffic flow conditions cannot be solved by measuring any single traffic parameter. A mathematical model which considers travel times, traffic volume, and speeds is presented.

Search terms: Traffic control;

Mathematical models; Traffic density; Speed; Travel time; Traffic flow; Traffic volume

HS-005 352 Fld. 2/9

INSTRUMENTATION IN TRAFFIC ENGINEERING 5. PHOTOGRAPHY, MEASUREMENT OF CONCENTRATION, VEHICLE MOUNTED INSTRUMENTS (1)

by F. D. Hobbs; B. D. Richardson

Published in *Traffic Engineering and Control* v9 n4 p202-3, 207 (Aug 1967)

The uses of photography and cinematography in traffic studies are discussed. Among the vehicle mounted instruments discussed are those for measuring time delays and travel times, tachometers, and meters to register fuel consumption.

Search terms: Traffic flow; Cinematography*; Photography; Tachometers*; Traffic surveys; Measuring instruments; Time factors*; Travel time; Fuel consumption; Traffic engineering

HS-005 396 Fld. 2/9

SEMI-PERMANENT TRAFFIC STRIPING

by Lowery W. Cody

Washington. Dept. of Highways, Olympia

1 May 1967 20p

Report no. PB-180 704

Presents data from a 3 year study of dome shaped plastic markers. Initial objective was the evaluation of the markers for traffic control and involved the elements of cost and visibility during inclement weather. The system is now standard for all primary highway west of the Cascade Mountain Range (Washington).

Search terms: Traffic markings; Washington*; Costs*; Thermoplastics*; Visibility; Reflecting surfaces; Plastics; Traffic control; Weather; Wet road conditions

AVAILABILITY: CFSTI as PB-180 704

HS-005 397 Fld. 2/9

NEW ELECTRONIC SYSTEM TO

2/9 Traffic Control (Cont.)

HS-005-397 (Cont.)

ELIMINATE TAILGATING

by Jim Dunne

Published in *Popular Science* v193 n6 p64-7 (Dec 1968)

Automatic Headway Control (AHC) is an electronic system which eliminates the need for a driver to use brake or accelerator pedal. Its 4 components are carried within the car: an infrared radar set, a computer, a modified standard brake, and throttle hooked up for electrical control. The system will weigh about 20 pounds. Production cost for the new car buyer is estimated at \$200-300.

Search terms: Automatically guided automobiles; Following distance; Computers; Tailgating; Electronic devices; Automatic Headway Control*; Brake systems*; Throttling*; Radar control

HS-005 398 Fld. 2/9; 4/7

SOME TRAFFIC SYSTEM ANALYSIS TECHNIQUES

by Joseph A. Wattleworth; Charles E. Wallace

Texas A and M Univ., College Station. Texas Transportation Inst.

Sept 1967 40p 9 refs

Project NCHRP-20-3

Report no. TTI-RR-488-4

Rept. no. 4 on Optimizing Freeway Corridor Operations through Traffic Surveillance, Communications and Control

Techniques for evaluating large traffic systems are badly needed. The input-output analysis technique for analysis of a freeway system is presented. Network analysis techniques are described, including total travel estimates, with statistical models of each. Aerial photography is used in estimating travel time. Techniques for single route analysis are described. A network information system is outlined.

Search terms: Systems analysis; Traffic data analysis; Aerial photography*; Traffic systems; Traffic flow; Travel time; Input-output

analysis*; Statistical analysis; Information systems; Highway usage; Freeways

AVAILABILITY: Corporate author

HS-005 399 Fld. 2/9

DEVELOPMENT AND EVALUATION OF A RAMP METERING SYSTEM ON THE LODGE FREEWAY

by Joseph A. Wattleworth; Charles W. Wallace; Moshe Levin; Gordon F. Paesani

Texas A and M Univ., College Station. Texas Transportation Inst.

Dec 1967 69p 13 refs

Project NCHRP-20-3

Report no. TTI-RR-488-3

Rept. no. 3 on Optimizing Freeway Corridor Operations through Traffic Surveillance, Communications and Control. Includes Appendix A by Gordon F. Paesani

This evaluation of the effectiveness of ramp control system on a Detroit freeway includes a traffic system analysis; design of traffic surveillance system; techniques used in evaluating the effects of control changes in network operation; development of a network signal retiming system.

Search terms: Benefit cost analysis*; Systems analysis; Traffic data analysis; Computers; Traffic flow; Access control; Traffic control; Ramps; Input-output analysis*; Traffic surveillance*; Detroit*; Traffic signals; Freeways; Travel time

AVAILABILITY: Corporate author

HS-005 400 Fld. 2/9

FOUR-WAY STOP. "A HIGHLY EFFECTIVE SAFETY DEVICE"

by John J. Heany

Philadelphia. Dept. of Streets, Pa.

1969 7p

Four-way stop signs require all approaching traffic to stop before passing through the intersection. Philadelphia considered accident prevention more important than traffic delay and authorized a trial

period. Accidents were reduced 87% at test intersections. Personal injuries were reduced by 92% and traffic fatalities were eliminated.

Search terms: Traffic control devices; Accident prevention; Accident location; Fatalities; Stop signs*; Injury prevention; Philadelphia*; Intersections

AVAILABILITY: Corporate author

HS-005 401 Fld. 2/9

EVALUATION OF THE BENEFITS OF TRAFFIC SURVEILLANCE AND CONTROL ON THE GULF FREEWAY

by W. F. McFarland; W. G. Adkins; W. R. McCasland

Texas A and M Univ., College Station. Texas Transportation Inst.

Jan 1969 46p 6 refs

Report no. TTI-RR-24-22

Sponsored by Texas Highway Dept., Austin, and Bureau of Public Roads, Washington, D.C.

Freeway surveillance and control have been used to improve traffic operation on and near the Gulf Freeway in Houston, Texas. This report gives an economic evaluation of the loss of time resulting from freeway obstructions and an evaluation of the benefits of freeway surveillance and control.

Search terms: Freeways; Traffic control; Benefit cost analysis*; Peak hour traffic; Travel time; Traffic congestion; Texas*; Traffic surveillance*; Obstructions

AVAILABILITY: Corporate author

HS-005 402 Fld. 2/9

RIGHT TURN MOVEMENTS AT SIGNALIZED INTERSECTIONS

by I. D. Gordon; A. J. Miller

Published in *Australian Road Research Board Proceedings of the Third Conference Sydney* v3 pt1 p446-59 (1966)

Report no. Paper-233

Determination of the phase requirements for major traffic movements at a signalized intersection usually

2/9 Traffic Control (Cont.)

HS-005-402 (Cont.)

presents little difficulty, but necessity for a separate phase for right-turning vehicles is often a matter of conjecture. Investigation is made into the number of right-turning vehicles which can filter through the opposed traffic flow under varying conditions of cycle time, length of green phase, and opposing flow. Fixed time operation of the signals is assumed.

Search terms: Gap acceptance*; Traffic permeability; Intersections; Traffic signals; Turning right; Traffic flow patterns; Statistical analysis; Time factors*; Signalized intersections*

HS-005 403 Fld. 2/9

AUTOMATIC SYSTEM CONTROLS FREEWAY RAMP MERGING TRAFFIC

by Alan F. Barney

Published in *World Road News* v3 n12 p4-5 (Dec 1968)

Under this ramp control system, the vehicle waits at the signal for a suitable gap to be sensed and is then released by the green light in time to accelerate and merge. This avoids a potential accident situation by permitting safe merging with the traffic mainstream and maximum freeway volume.

Search terms: Ramps; Merging traffic; Electronic traffic control; Gap acceptance*; Traffic flow; Detectors; Freeways

HS-005 404 Fld. 2/9; 1/3

STUDY OF WRONG WAY TRAFFIC ON FREEWAY RAMPS. ANALYSIS OF WRONG-WAY INCIDENTS ON MICHIGAN FREEWAYS. INTERIM REPORT

Michigan. Dept. of State Highways, Lansing. Traffic and Safety Div.

May 1968 22p

Prepared in cooperation with Bureau of Public Roads, Washington, D.C., and Michigan Dept. of State Police.

Analysis was made of 200 wrong-way incidents and 44 accidents. The data indicate that 50% of the incidents involve drinking drivers and generally occur at night. Half of the accidents involved drivers with ten or more violation points, many of whom were driving without a valid license.

Search terms: Wrong way; Free-ways; Michigan*; Accident causes; Night driving; Drinking drivers; Problem drivers; Fatalities; Injuries; Time factors*; Traffic violations; Ramps; Accident analysis

AVAILABILITY: Corporate author

HS-005 429 Fld. 2/9

30TH PEAK HOUR FACTOR TREND

by E. F. Reilly; R. D. Radics

New Jersey. State Highway Dept., Trenton. Bureau of Safety and Traffic

Aug 1966 18p 5 refs

Methodology is presented for the study of the 30th peak hour factor, using data from counting stations in Pennsylvania and New Jersey. The Pennsylvania data yielded a lower rate of reduction of the 30th peak hour factor with time. Discrepancies probably result from population and land use changes. The 30th peak hour factor trend is compared to urban-rural classification and average annual daily traffic.

Search terms: Traffic data analysis; Land use; Peak hour traffic; Traffic volume variations; Highway usage; New Jersey*; Pennsylvania*; Population density; Traffic counters; Time factors*; Rural areas; Urban areas

AVAILABILITY: Corporate author

HS-005 431 Fld. 2/9

SUCCESSOR TO SPEEDOMETER FOUND; WOULD CUT REAR-END COLLISIONS

Anonymous

Published in *Traffic Digest and Review* v12 n3 p7 (Mar 1964)

Describes the Spaceometer, meant to replace to speedometer. It would indicate in addition to speed the number of car lengths driver should

be from the car ahead, thus cutting down on too close following, which is a leading cause of rear end collisions.

Search terms: Following distance; Rear end collisions; Speed; Car following*; Spaceometer*; Accident prevention

HS-005 432 Fld. 2/9

THE BENEFITS OF COMPUTER TRAFFIC CONTROL

by Roy L. Wilshire

Published in *Traffic Engineering* v39 n7 p16-20 (Apr 1969)

Describes a digital computer system in Wichita Falls, Texas, used to control intersections. Accidents and delays have been reduced. Costs of the system and techniques of its operation are outlined.

Search terms: Digital computers; Accident prevention; Traffic control devices; Costs*; Intersections; Traffic systems; Time factors*; Texas*

HS-005 433 Fld. 2/9

CONTINUOUS LEFT TURN CHANNELIZATION AND ACCI- DENTS

by Richard C. Thomas

Published in *Traffic Engineering* v37 n3 p37-40 (Dec 1966)

Left turn lines improved traffic flow and decreased left turn, rear end, pedestrian, injury and fatal accidents by an average of 20%. Project described is in Denver.

Search terms: Turning left; Traffic flow; Traffic control devices; Lane lines*; Pedestrian accidents; Rear end collisions; Fatalities; Injuries; Accident rates; Colorado*; Motor vehicle accidents

HS-005 434 Fld. 2/9; 4/7

AN AUTOMATIC SYSTEM FOR LONGITUDINAL CONTROL OF INDIVIDUAL VEHICLES

by R. L. Cosgriff; J. J. English; W. B. Roeca

2/9 Traffic Control (Cont.)

HS-005-434 (Cont.)

Published in *Highway Research Record* n122 p7-18 (1966)

In order to meet the requirements for a system to control individual vehicles in a traffic stream it was necessary to combine linear and non-linear modes of control. The system has been analyzed in the car-following situation in single lane traffic with up to three cars in a line. Results of present analysis indicate that good performance can be expected. More extensive evaluation for many cars in a platoon and for comparison with the present manual system has not been completed.

Search terms: Traffic control; Car following*; Automatically guided automobiles; Manual control; Mathematical analysis

HS-005 435 Fld. 2/9

THE SYNCHRONIZATION OF TRAFFIC SIGNALS FOR MINIMUM DELAY

by John A. Hillier; Richard Rothery

Published in *Transportation Science* v1 n2 p81-94 (May 1967) 9 refs

Vehicular platoons were studied to ascertain whether neighboring intersections can be effectively coupled on the basis of traffic behavior. Platoons diffuse as they move from one intersection to the next, and this diffusion can be taken into account in the setting of signals. Total delay in vehicle-hours per hour of green as a function of offset time is calculated. The optimal offset time that would minimize delay is shown to be a linear function of the distance from the issuing traffic signal.

Search terms: Traffic signals; Traffic flow; Intersections; Traffic data analysis; Time factors*

HS-005 436 Fld. 2/9

SPEED LIMIT TRAIL IN HIGHWAY TRAFFIC IN OCTOBER-NOVEMBER 1966. ABRIDGEMENT

by Sauli Hakkinen; Urpo Leppanen

Central Organisation for Traffic Safety in Finland, Helsinki (Finland)

1968 55p 17 refs

Report no. TALJA-8

A general speed limit of 90 km/h (approx. 55 mph) was applied to all Finnish roads (unless lower limits were in effect) during Oct.-Nov. 1966. This study analyzed data to determine the effect of the general speed limit on the number and severity of road traffic accidents. Reductions were apparent although research methods were not final.

Search terms: Speed reduction; Speed limits; Finland*; Accident prevention; Fatalities; Injuries; Traffic accident analysis; Accident severity; Environmental factors; Accident data; Accident rates

AVAILABILITY: Corporate author

HS-005 437 Fld. 2/9; 4/7

THE EFFECT OF RIGHT-TURNING VEHICLES ON SATURATION FLOW THROUGH SIGNALIZED INTERSECTIONS

by R. L. Pretty

Published in *Australian Road Research Board Proceedings of the Third Conference*, Sydney v3 pt1 p460-70 (1966)

Report no. Paper-263

Describes a theoretical method using computer simulation for estimating the reduction in saturation flow through a signalized intersection due to the presence of right-turning vehicles. Parameters are volume of the given flow, percentage of right-turners, volume of opposing flow, and percentage of right-turners in opposing flow. Regression analysis gives saturation flow in terms of the four parameters.

Search terms: Computerized simulation; Regression analysis*; Parameters; Turning right; Traffic flow; Intersections; Traffic signals; Traffic capacity

HS-005 438 Fld. 2/9; 3/4

WRONG-WAY DRIVING OFF-RAMP STUDIES (EXTENSION OF PHASE 2). FINAL REPORT.

by Slade Hulbert; Jinx Beers

California Univ., Los Angeles. Inst. of Transportation and Traffic Engineering

Dec 1966 20p 7 refs

Report no. ITTE-RR-50

Drivers were observed and their responses measured as they unexpectedly came upon wrong way ramp message signs. Five different messages were tested. Those not including the words "wrong way" were more confusing to drivers. An estimated 5% of young normal drivers can be expected to ignore the signs.

Search terms: Freeways; Wrong way*; Highway signs; Ramps; Driver behavior; Young adult drivers*; California*

AVAILABILITY: Corporate author

HS-005 439 Fld. 2/9; 4/7

FORCED MERGING IN TRAFFIC

by W. S. Jewell

Published in *Operations Research* v12 n6 p858-69 (Nov/Dec 1964) 12 refs

A vehicle waiting at an intersection with a major road makes a merging maneuver into mainstream traffic. This paper examines the resulting disturbance made by this forced entry and shows that disturbance propagation is equivalent to a related queueing model. There is some minimal mainstream headway which should be forced in order to maximize the rate at which entries can be made from the secondary road. Two measures of accident potential for the merging maneuver are discussed.

Search terms: Merging traffic; Mathematical models; Gap acceptance*; Queueing theory*; Traffic flow; Accident risks; Traffic permeability; Traffic data analysis

HS-005 488 Fld. 2/9

CENTRALIZED TRAFFIC CONTROL BY SIGNALS AND TELEVISION

by E. Bontems

Published in *Road International* n63 p32-5 (Dec 1966)

Presented at the International Road Federation Fifth World Meeting

2/9 Traffic Control (Cont.)

HS-005-488 (Cont.)

System used in Lausanne, Switzerland, is described. Most of the streets were widened, and travel time in the central business district has been reduced although traffic has increased. The operation and equipment of the control center are described.

Search terms: Traffic control devices; Central business districts; Travel time; Streets; Traffic signals; Television systems; Traffic volume; Switzerland*; Intersections; Signalized intersections*

HS-005 489 Fld. 2/9

IMPROVING ROAD CAPACITY

by F. V. Webster; F. C. Blackmore

England. Road Research Lab., Crowthorne, Berks.

Published in *Science Journal* p69-74 (Aug 1968) 7 refs

Traffic delays occur most often at road intersections. Road enlargement is expensive and often impractical. New designs which can increase intersection capacity and improve traffic flow are examined.

Search terms: Intersections; Traffic flow; Traffic congestion; Lane capacity; Highway design; Traffic signals; Traffic circles; Widening*

HS-005 490 Fld. 2/9

LEADING & LAGGING GREENS IN TRAFFIC SIGNAL CONTROL

Published in *Traffic Engineering* v36 n7 p21-30 (Apr 1966)

Questionnaires were sent to traffic engineers of 168 jurisdictions in various countries to gather information on the use of intervals of green lights at signalized intersections. Results of the survey are tabulated, and the advantages of leading and lagging green signals are discussed. Additional research in this field of traffic signalization is recommended.

Search terms: Signal color; Traffic signals; Time factors*; Questionnaires*; Traffic surveys;

Traffic data analysis; Data acquisition; Intersections

HS-005 491 Fld. 2/9

MORE EFFECTIVE VEHICLE MERGING IS POSSIBLE FOR URBAN FREEWAYS

by Louis J. Horn

Published in *Texas Transportation Researcher* v4 n4 p6-7 (Oct 1968)

Describes two computerized systems for metering of entrance ramps to freeways. A gap oriented system provides better traffic flow. Types of equipment used are outlined.

Search terms: Electronic traffic control; Traffic control devices; Gap acceptance*; Traffic flow; Freeways; Ramps

HS-005 492 Fld. 2/9

RAMP METERING TRAFFIC CONTROL SYSTEM

by Alan F. Barney

Published in *Traffic Engineering and Control* v10 n11 p563-4 (Mar 1969)

Describes an experimental ramp control system developed by Automatic Signal, a division of Laboratory for Electronics, Inc., of Norwalk, Connecticut. The major methods of ramp control are discussed. System components, special problems, and priority commands of the new system are presented.

Search terms: Ramps; Traffic control devices; Gap acceptance*; Merging traffic; Traffic volume; Signal devices; Detectors; Traffic capacity; Freeways

HS-005 551 Fld. 2/9; 4/7

ANALYSIS OF EXPERIMENTS ON SINGLE-LANE BUS FLOW

by R. Rothery; R. Silver; R. Herman; C. Torner

Published in *Operations Research* v12 n6 p913-33 (Nov/Dec 1964) 10 refs

Using pairs of buses theoretical "car-following" models of single-lane traffic flow, which had been shown by previous work to be valid for automobiles, are examined for this type of heavy vehicle and found to

provide a good representation of the detailed manner in which one bus follows another. Stability and steady state characteristics of a stream of buses have been examined.

Search terms: Car following*; Mathematical models; Traffic flow; Buses (vehicles); Steady state; Traffic characteristics

HS-005 552 Fld. 2/9

TRAFFIC SURVEY AT 1300 SITES

by Janice A. Timbers

Road Research Lab., Crowthorne, Berks. (England)

1968 44p

Report no. RRL-LR-206; PB-182 826

Traffic counts were used to assess the amount of travel in Great Britain in 1966 and to determine the types of road carrying various amounts of traffic. Since a similar survey in 1959-60 there has been a 54% increase in motor vehicle travel. Traffic growth has been greater in urban than in rural areas and greater on minor than on main roads. In 1966, 3% of motor vehicle travel was on motorways, 55% on urban roads, and 42% on rural roads.

Search terms: Traffic data analysis; Traffic surveys; Great Britain*; Rural highways; Urban highways; Highway usage; Travel patterns; Traffic volume; Data acquisition

AVAILABILITY: CFSTI as PB-182 826

HS-005 553 Fld. 2/9

LONDON'S COMPUTERIZED TRAFFIC

by Ted Holland

Published in *Engineering* v207 n5367 p374-5 (7 Mar 1969)

In this experiment two computers receive traffic data over time-division multiplexed landlines. Eight closed-circuit television cameras are installed at critical locations. Improved traffic movement is the finding after one year's operation—an important short-term solution to congestion without any demolition of existing buildings.

2/9 Traffic Control (Cont.)

HS-005-553 (Cont.)

Search terms: London*; Computers; Traffic flow; Traffic congestion; Television systems; Closed circuit television*; Traffic control

HS-005 554 Fld. 2/9

THE HIGHWAY MERGING AND QUEUING PROBLEM

by David H. Evans; Robert Herman; George H. Weiss

Published in *Operations Research* v12 n6 p832-57 (Nov/Dec 1964) 20 refs

Presents models for car queuing at a stop sign when the drivers in line wish to merge with a stream of traffic on an intersecting main highway. Includes discussion of the importance of sampling in improving simulation techniques for the analysis of traffic queuing models.

Search terms: Queuing theory*; Merging traffic; Mathematical models; Gap acceptance*; Intersections; Traffic flow patterns; Stop signs*; Traffic data analysis

HS-005 574 Fld. 2/9; 4/8

GATESHEAD TRAFFIC MANAGEMENT SCHEME. (2) IMPLEMENTATION

by K. B. Madelin; J. A. Ford

Published in *Traffic Engineering and Control* v10 n3 p137-9 (Jul 1968)

Describes the introduction of a traffic control system, preceded by considerable publicity and the installation of new signs, traffic markings, and other improvements. The new system segregates congested northbound traffic from traffic bound for the town center and provides a bus priority route.

Search terms: Great Britain*; Traffic control; Buses (vehicles); Traffic systems; Traffic flow; Traffic congestion; Central business districts; Traffic signs; Traffic markings; Public relations; Public transportation

HS-005 575 Fld. 2/9; 4/8

GATESHEAD TRAFFIC MANAGEMENT SCHEME. (1) THE TRAFFIC PROBLEM AND PROPOSALS

by K. B. Madelin; J. A. Ford

Published in *Traffic Engineering and Control* v10 n2 p80-83 (Jun 1968)

Outlines the traffic situation, bridge capacities, and bus services of the Newcastle upon Tyne and Gateshead areas. Describes the traffic control plans and illustrates them with maps.

Search terms: Traffic control; Great Britain*; Bridges (structures); Buses (vehicles); Traffic flow; Traffic systems; Public transportation

HS-005 576 Fld. 2/9; 4/8

GATESHEAD TRAFFIC MANAGEMENT SCHEME. (3) BEFORE AND AFTER STUDIES AND RESULTS

by K. B. Madelin; J. A. Ford

Published in *Traffic Engineering and Control* v10 n4 p181-4 (Aug 1968)

Before and after studies of traffic volumes, journey times, and accidents are given. Traffic volume was increased while journey time and accidents decreased. Bus service and pedestrian safety have also improved. The police traffic control load has decreased. The traffic control plan is considered successful.

Search terms: Traffic control; Police traffic services; Great Britain*; Traffic volume; Buses (vehicles); Pedestrian safety; Time factors*; Accident rates; Travel time; Public transportation

HS-005 577 Fld. 2/9

COMPUTER TRAFFIC CONTROL IN TEXAS

by Roy L. Wilshire

Published in *Traffic Engineering and Control* v10 n10 p505-8 (Feb 1969)

Traffic control by digital computer in Wichita Falls, Texas has reduced delays by 31.1% and accidents by 8.5%. A description of the system, its traffic control equipment, control techniques, results of computer control, and an evaluation of its effectiveness are presented in this article.

Search terms: Digital computers; Traffic flow; Texas*; Detectors; Traffic control; Costs*; Accident prevention; Time factors*; Traffic volume

HS-005 620 Fld. 1/3; 2/9

AN EXAMINATION OF THE EFFECT OF RAISING THE SPEED LIMIT IN BUILT-UP AREAS IN VICTORIA

by B. C. S. Harper

Published in *Australian Road Research Board Proceedings of the Third Conference, Sydney* v3 pt1 p647-88 (1966)

Report no. Paper-296

Studies of the effects of increasing the urban speed limit from 30 to 35 mph include traffic density and the possible effect on accident rates. The comparison suggests that the shape of the density function of vehicle speeds may be a contributing factor in accident occurrence. Accident statistics, mileage statistics, and speed patterns are given.

Search terms: Speed limits; Accident rates; Urban areas; Australia*; Accident factors; Vehicle miles*; Speed patterns; Traffic density; Accident data

HS-005 629 Fld. 2/9

AN EVALUATION OF TWO TYPES OF FREEWAY CONTROL SYSTEMS

by Joseph A. Wattleworth; Kenneth G. Courage; James D. Carvell, Jr.; Charles E. Wallace; Moshe Levin

Texas A and M Univ., College Station. Texas Transportation Inst.

Apr 1968 307p 63 refs

Project NCHRP-20-3

Report No. TTI-RR-488-6

Rept. no. 6 on Optimizing Freeway Corridor Operations through Traffic Surveillance, Communications and Control. Includes Appendix B by Charles E. Wallace and Moshe Levin. This copy is an uncorrected draft.

The National Proving Ground Traffic Control System was tested for its effectiveness. Evaluations of a ramp metering system and

2/9 Traffic Control (Cont.)

HS-005-629 (Cont.)

cost-effectiveness analyses were made. The studies were conducted on only one traffic control system and one freeway. Results should not necessarily be translated directly to other systems.

Search terms: Traffic control devices; Freeways; Benefit cost analysis; Ramps; Communication systems; Traffic systems; Traffic control; Statistical analysis

AVAILABILITY: Corporate author

HS-005 630 Fld. 2/9

SPECIAL PURPOSE TRAFFIC SURVEY DEVICES. TECHNICAL REPORT

Institute of Traffic Engineers, Washington, D.C.

Published in *Traffic Engineering* v36 n5 p29-41 (Feb 1966)

Four classes of devices and their uses are described: vehicle mounted devices, road devices, photographic equipment and methods for traffic engineering studies, and multiplexing and other data transmission equipment.

Search terms: Traffic data analysis; Photography; Traffic engineering; Data processing; Traffic surveys; Data acquisition

HS-005 631 Fld. 2/9

AUTOMATIC RECORDING OF TRAFFIC SIGNAL OFFENSES

by M. Bittmann

Published in *Traffic Digest and Review* v16 n11 p3-8 (Nov 1968)

A system of traffic surveillance in Tel Aviv, Israel, uses a camera housed on top of a ten-foot pole, which automatically photographs cars that have run a red light. The owners of the vehicles are then contacted, charged with the offence, and tried. The special legislation authorizing the system, reasons for its implementation, and advantages are covered. This method of detection is of particular interest

as it is one of the first operational systems to be applied in the area of police traffic enforcement.

Search terms: Israel*; Traffic law enforcement; Photography; Traffic violations; Electronic traffic control; Traffic control devices; Traffic surveillance*; Detectors; Traffic signals

HS-005 674 Fld. 2/9

PENNSYLVANIA MOTORISTS BENEFIT FROM SYSTEMATIC SIGNING

Anonymous

Published in *Better Roads* v38 n8 p36-7 (Aug 1968)

Pennsylvania's signing program as applied to interstate and primary highways is reviewed. Some innovations and improvements such as the "rolling three" system, which uses three signs to give motorist advance warning of the point he is approaching, sign and lettering size, and the systematic pattern used in rural and urban areas are shown.

Search terms: Highway signs; Pennsylvania*; Signs (displays); Interstate highway system; Directional signs

HS-005 675 Fld. 2/9

HIGHWAY SIGN RESEARCH

by Douglas B. Fugate

Published in *American Road Builder* v44 n6 p14-6, 21-2 (Jun 1967)

The results of an experiment to produce information useful in the development of criteria for highway signs is outlined. Panels, erected on the roadside and on ramps, provided information on gasoline stations, eating places, motels, and rest areas. The study covered color, trademarks, size, and location of signs. Also discussed is a recently completed study dealing with directional signing on freeways.

Search terms: Highway signs; Directional signs; Rest areas*; Service stations*; Freeways; Interstate highway system; Design standards

HS-005 676 Fld. 2/9; 3/4

POPULATION EXPECTANCIES AND TRAFFIC SYSTEM DESIGN

by W. McGill

Published in *Australian Road Research* v2 n7 p19-42 (Mar 1966)

Tasks are performed best when the responses required are expected or natural from past experience. The application of this principle to traffic system design should reduce driving difficulty. Its implications for traffic signal coding have been investigated. A consideration of right-of-way in terms of population expectancies and existing laws suggests a need to re-examine the present system. Material gathered in interviews with drivers and reporting their opinions of driving and traffic problems is included.

Search terms: Driver performance; Driving tasks; Driver behavior; Traffic signals; Right-of-way (traffic rules)*; Populations; Traffic laws; Traffic control; Interviews*; Australia*; Intersections

HS-005 677 Fld. 2/9

TRAFFIC ENGINEERING AND MANAGEMENT IN THE CENTRAL AREA OF LIVERPOOL

by N. H. Stockley; A. J. R. Evans

Published in *The Surveyor and Municipal Engineer* v129 n3899 p19-24, 61 (25 Feb 1967)

A comprehensive traffic management plan is described, including one-way streets, traffic signal controls, parking facilities, television surveillance, centralized computer control. Management, operations, and future plans are outlined.

Search terms: Traffic control; Great Britain*; Computers; Television systems; Traffic surveillance*; Traffic signals; One way streets; Parking; Tunnels

HS-005 742 Fld. 2/9

TRAFFIC STUDIES AND URBAN CONGESTION

by R. J. Smeed

Published in *Journal of Transport Economics and Policy* v2 n1 p33-70 (Jan 1968) 12 refs

The capacity of urban roads is discussed. Road width needed for travel, average journey length during peak periods, a formula for the number of vehicles per hour able to reach their destinations in a town center, speed

2/9 Traffic Control (Cont.)

HS-005-742 (Cont.)

patterns, time losses due to congestion, commuter travel patterns by bus and car are included. Possibilities for improvement in traffic conditions are outlined. Data studied are chiefly for British and American cities.

Search terms: Great Britain*; United States*; Traffic congestion; Traffic density; Traffic data analysis; Traffic flow patterns; Speed patterns; Traffic volume; Travel time; Travel patterns; Peak hour traffic; Central business districts; Time factors*; Commuting patterns; Buses (vehicles); Urban areas; Mathematical analysis*; Highway characteristics

HS-005 743 Fld. 2/9

AERIAL PHOTOGRAPHY AIDS FREEWAY TRAFFIC STUDIES

Anonymous

Published in *Better Roads* v38 n8 p18-21 (Aug 1968)

The California Institute of Transportation and Traffic Engineering has undertaken a 32-month program of investigation in which photographic techniques and mathematical computer analysis are being used to study the weaving and emerging patterns of vehicles on the freeway as they approach an exit ramp. The photographic method, camera systems, data extraction techniques are described.

Search terms: Aerial photography*; Freeways; Ramps; Merging traffic; Data processing; Computers; Traffic congestion; Exits; Mathematical analysis*; Weaving traffic; Los Angeles*; Traffic data analysis*; Traffic flow patterns

HS-005 744 Fld. 2/9

TRAFFIC-CONTROL DEVICES AND THE STATUS OF CONFORMITY

Anonymous

Published in *Better Roads* v38 n8 p30-3 (Aug 1968)

A state-by-state summary indicates current status and expectations toward conformity of traffic-control

devices on federal-aid roads with the "Manual on Uniform Traffic Control Devices." The most pertinent problem is lack of authority over local governments or lack of enforcement powers at the state level.

Search terms: Traffic control devices; Standards; State government; Federal aid; Compliance procedures*; Interstate highway system; Traffic signals; Traffic signs; Traffic markings

HS-005 745 Fld. 2/9

TRAFFIC SIGNAL CONTROL USING TELEVISION

by Howard T. Tillotson

Published in *Traffic Engineering & Control* v10 n5 p245-9 (Sep 1968) 5 refs

This preliminary study of London traffic control has shown that it is possible for an observer, relying on television alone for a picture of an intersection, to apply effective control to that intersection. The closed circuit television installation was not adapted for traffic control and had many disadvantages. The effect of the traffic control operator's fatigue was investigated.

Search terms: Closed circuit television*; Television systems; Traffic control; Traffic surveillance*; London*; Intersections; Fatigue (biology); Traffic signals

HS-005 746 Fld. 2/9

GULF FREEWAY SURVEILLANCE AND CONTROL PROJECT

by Charles Pinnell

Published in *Traffic Quarterly* v20 n1 p31-47 (Jan 1966) 13 refs

Extremely beneficial results in improved freeway traffic flow can be realized through the utilization of freeway control and surveillance. The research activities of the Gulf Freeway project in Houston are described. Objectives of the first two years were development of a control plan for inbound lanes, design modifications necessary for satisfactory control, and a closed circuit television system.

Search terms: Freeways; Traffic surveillance*; Traffic control; Television systems; Closed circuit tele-

vision*; Access control; Ramps; Texas*; Traffic flow

HS-005 747 Fld. 2/9

CLOSED CIRCUIT TELEVISION AS AN AID TO TRAFFIC MANAGEMENT

by A. Dockerty

Published in *Journal of the Institution of Highway Engineers* v14 n2 p15-7, 19, 20-2, 24 (Feb 1967) 8 refs

The use of television for the collection of on-site traffic data is described, together with the types of equipment available and its costs. The choice of fixed or panning cameras for urban intersections is discussed. Results of queue length and journey time studies are included. Installations in various British and American cities are described.

Search terms: Television systems; Closed circuit television*; Traffic surveillance*; Traffic control; Intersections; Great Britain*; United States*; Queueing theory*; Travel time; Traffic data analysis

HS-005 748 Fld. 2/9

A NATIONWIDE STUDY OF FREEWAY MERGING OPERATIONS

by Johann H. Buhr; Donald R. Drew; Joseph A. Wattleworth; Thomas G. Williams

Published in *Highway Research Record* n202 p76-122 (1967)

Presented at the 46th Annual Meeting of the Highway Research Board

A research project on gap acceptance and traffic interaction in the freeway merging process is described. Field studies for the collection of data were performed on a nationwide basis utilizing an aerial photographic technique. This technique, the data reduction methods, and the study sites selected are described in detail.

Search terms: Freeways; Merging traffic; Ramps; Aerial photography*; Traffic planning; Traffic flow; Data reduction; Highway design; Gap acceptance*; Traffic data analysis

2/9 Traffic Control (Cont.)

HS-005 749 Fld. 2/9; 4/7

TRAFFIC ASSIGNMENT BY IBM

by Gerald Wood

Published in *Traffic Quarterly* v15 n2 p331-340 (Apr 1961)

A transportation study being made in a small Missouri city is testing the use of computers to assign traffic to the arterial street network. Costs, program control, and reliability of the computer equipment are discussed. Control of lane capacity is one of the major problems. Traffic planning in larger Missouri cities is also discussed.

Search terms: Computers; Traffic flow; Missouri*; Streets; Traffic control; Costs*; Traffic planning; Traffic lanes; Computer programs

HS-005 750 Fld. 2/9; 4/7

MULTIPLE ENTRIES IN TRAFFIC

by William S. Jewell

Published in *Journal of the Society for Industrial and Applied Mathematics* v11 n4 p872-85 (Dec 1963)

15 refs

Contract Nonr-222(83)

The multiple-entry queueing problem of traffic has been studied. Experimental data on intersection dynamics would verify the assumptions of the multiple entry model. Given gap acceptance criteria, the problem is to determine the statistics of waiting time of secondary units until an acceptable headway appears.

Search terms: Queueing theory*; Mathematical models; Merging traffic; Gap acceptance*; Traffic flow; Intersections; Time factors*; Access control

HS-005 790 Fld. 2/9

WRONG-WAY DRIVING (PHASE III) (DRIVER CHARACTERISTICS, EFFECTIVENESS OF REMEDIAL MEASURES, AND EFFECT OF RAMP TYPE). INTERIM REPORT NO. 2

by Thomas N. Tamburri; P. R. Lowden, Jr.

California. Dept. of Public Works, Sacramento. Traffic Dept.

Jun 1969 77p 12 refs

Prepared in cooperation with Bureau of Public Roads, Washington, D.C.

The effectiveness of signs and reflective pavement markers in reducing wrong-way driving violations and accidents on California freeways and expressways was evaluated. Before and after studies indicated a reduction of wrong-way violations by 60% on freeways and 70% on expressways. An estimated 140 accidents were also prevented. The signs were found effective but the pavement arrows were of no benefit. Study of 168 wrong-way drivers found that they had more driving violations, accidents, and felony convictions than the average motorist.

Search terms: Wrong way*; Accident prevention; Problem drivers; Directional signs; Freeways; Controlled access highways; Driver records; Traffic violations; Highway signs; Traffic markings; Reflecting surfaces

AVAILABILITY: Corporate author

HS-005 830 Fld. 2/9

COMPUTER-CONTROLLED VEHICULAR TRAFFIC

by Gordon D. Friedlander

Published in *IEEE Spectrum* v6 n2 p30-43 (Feb 1969)

Computer-controlled traffic networks have taken hold as is apparent from the operational systems in Toronto, San Jose, and Wichita Falls. London and Glasgow experiments also discussed. Systems designs and types of equipment are illustrated and explained.

Search terms: Toronto*; San Jose*; Glasgow*; London*; Traffic signal networks*; Traffic control; Computers; Automatic control; Electronic traffic control; Traffic volume; Traffic density; Systems engineering; Detectors; Control equipment; Performance tests; Traffic surveillance*; Texas*

HS-005 831 Fld. 2/9

TRUCK EQUIVALENCY

by D. W. Gwynn

New Jersey. Bureau of Safety and Traffic, Trenton

Oct 1966 45p

Prepared in cooperation with Bureau of Public Roads, Washington, D.C.

Headways were investigated in passenger car lanes with less and 5% trucks and in lanes where cars followed trucks, trucks followed cars, and trucks followed trucks. Average headways of vehicle queues were also studied. It was concluded that the percentage of trucks in a traffic lane has an effect on the average headway of all vehicles in the lane. Headway increases as the percentage of trucks increases. The number of trucks in a queue of 11 vehicles affects the average headway in the queue.

Search terms: Automobiles; Trucks; Queueing theory*; Traffic flow patterns; Traffic lanes; Headway; Traffic data analysis; Traffic volume; Truck equivalency*

AVAILABILITY: Corporate author

HS-005 832 Fld. 2/9

TRUCK EQUIVALENCY

by Eugene F. Reilly; Joseph Seifert
New Jersey. Bureau of Safety and Traffic, Trenton

Jun 1968 34p

Prepared in cooperation with Bureau of Public Roads, Washington, D.C.

A road with an average annual daily traffic of 68,000 vehicles with a high percentage of trucks was studied under uninterrupted flow conditions. Relationship between mixed volume of cars and trucks and of cars only was determined for truck groups. The passenger car equivalent of trucks was found to approach a value of two as the per cent of trucks in the stream approached 100%. Relationship between cars and trucks was determined on the basis of equal speeds.

Search terms: Trucks; Traffic flow; Speed patterns; Traffic lanes; Traffic data analysis; Traffic volume; Highway usage; Automobiles; Headway*; Truck equivalency*

AVAILABILITY: Corporate author

HS-005 833 Fld. 2/9

A STANDARD FOR ADJUSTABLE FACE VEHICLE TRAFFIC CON-

2/9 Traffic Control (Cont.)

HS-005-833 (Cont.)

TROL SIGNAL HEADS. REVISED ITE STANDARD

Institute of Traffic Engineers, Washington, D.C.

Published in *Traffic Engineering* v36 n8 p21-7 (May 1966)

This standard provides a guide for the preparation of minimum purchase specifications for adjustable face vehicle traffic control signal heads. The standard represents the minimum requirements for the equipment described.

Search terms: Traffic control devices; Traffic signals; Standards

HS-005 834 Fld. 2/9

THE VALUE OF TRAFFIC MANAGEMENT

by J. M. Thomson

Published in *Journal of Transport Economics and Policy* v2 n1 p3-32 (Jan 1968) 16 refs

The effects of traffic management in central London are evaluated. The traffic capacity of the network of streets, the factors affecting capacity, journey length, and increase in capacity are discussed. It is concluded that the true capacity has declined, largely because of increased journey lengths. Other factors considered are off-peak traffic, the influence of public bus transport, pedestrian movement, accident rates. Reasons for the failure of traffic management to solve problems in London are discussed.

Search terms: Traffic control; London*; Traffic capacity; Public transportation; Traffic planning; Travel time; Travel patterns; Pedestrians; Accident rates; Streets; Peak hour traffic; Buses (vehicles)

HS-005 867 Fld. 2/9

THE APPROACH TO CONTROL IN WEST LONDON

by B. M. Cobbe

Published in *Surveyor and Municipal Engineer* v129 n3899 p27-30 (25 Feb 1967) 6 refs

Presented at the IME-ICE-IEE Joint Symposium on Area Control of Road Traffic, London, Feb. 1967.

The master controlled system operated in the Cromwell Road experiment in West London is described. Control facilities, system security, the aims of the experiment and operational facilities are discussed. A cost-benefit analysis for the system is included.

Search terms: London*; Traffic control; Benefit cost analysis*; Closed circuit television*; Television systems; Traffic surveillance*; Costs*; Electronic traffic control; Traffic volume; Traffic counters; Traffic flow

HS-005 930 Fld. 5/0; 1/1; 2/9

THE DETROIT CITIZENS BAND RADIO DRIVER AID NETWORK

by Herbert J. Bauer; Clark E. Quinn
General Motors Research Labs., Warren, Mich.

10p

System is used to report unsafe conditions on the city's roads, vehicular accidents, stalled cars, inoperative signal lights. Direct contact with law enforcement and other city services is available. The reports are recorded on computer cards from which many types of data analysis can be done.

Search terms: Traffic data analysis; Accident reports; Signal lights; Emergency services; Communication systems*; Data processing; Radio communication*; Driver aid, information and routing*

AVAILABILITY: Paper 27 in General Motors Proving Ground, PROC. OF AUTOMOTIVE SAFETY SEMINAR, 11-12 Jul 1968 (HS-005 901)

HS-005 940 Fld. 1/3; 2/9

A PHILOSOPHY FOR ACCIDENT PREVENTION

by Edmund J. Cantilli

Published in *Traffic Engineering* v35 n8 p21, 44, 46, 48 (May 1965)

Suggests that elimination of traffic accidents, rather than mere reduction, is an achievable goal. The total elimination of accidents is equivalent to a

complete removal of vehicle control from the driver. The goal should be automated highways with programmed destinations and travel patterns to be punched into a control board. A logical progression towards achievement of this goal is outlined, beginning with traffic control methods available now.

Search terms: Accident prevention; Automatically guided automobiles; Highway safety; Electronic traffic control; Automatic highways; Automatic control; Motor vehicle control; Traffic accidents; Travel patterns; Traffic engineering

HS-005 960 Fld. 2/9; 4/7

PROPERTIES OF VEHICLE-ACTUATED SIGNALS: 2. TWO-WAY STREETS

by G. F. Newell; E. E. Osuna

Published in *Transportation Science* v3 n2 p99-125 (May 1969) 9 refs

A vehicle-actuated signal at the intersection of two two-way streets (four way intersection) at which there is no turning traffic is analyzed. If the flows in opposite direction on the two-way streets are nearly equal and the intersection is nearly saturated, then it is very inefficient for a vehicle-actuated signal to hold green until the last of the two discharging queues has vanished. Comparisons are made with fixed cycle signals.

Search terms: Traffic actuated signals*; Two way traffic*; Queueing theory*; Intersection; Fixed time traffic signals*; Mathematical analysis*; Traffic flow

HS-006 014 Fld. 1/3; 2/9

SPEED ZONING: A THEORY AND ITS PROOF

by William C. Taylor

Published in *Traffic Engineering* v35 n4 p17+ (Jan 1965) 6p

Presents a new theory of speed zoning and the results of tests designed to validate it. Theory is that a relationship exists between the rate of accident occurrence and the distribution of speeds on rural highways and that the effectiveness of speed zoning in reducing accidents depends on speed distribution before and after zoning.

2/9 Traffic Control (Cont.)

HS-006-014 (Cont.)

Search terms: Accident prevention; Accident rates; Rural highways; Speed patterns; Zones; Speed limits; Variables*

HS-006 034 Fld. 3/11; 2/9; 4/1

PEDESTRIAN RESPONSE TO RED LIGHTS

National Committee on Uniform Traffic Laws and Ordinances, Washington, D.C.

Published in *Traffic Laws Commentary* n69-3 pl-13 (3 Sep 1969)

Contract FH-11-6869

The pro's and con's of allowing pedestrians to start crossing when facing a red light are discussed. There is a conflict on this between the Uniform Vehicle Code and the Manual on Uniform Traffic Control Devices for Streets and Highways. Variations in state laws are discussed.

Search terms: Pedestrian behavior; Pedestrian safety; Uniform Vehicle Code*; Manual on Uniform Traffic Control Devices for Streets and Highways*; State laws; Law uniformity; Traffic signals; Traffic control; Signal color; Intersections

HS-006 054 Fld. 2/0; 2/9

OPTICAL PROPERTIES OF REFLEX REFLECTORS AND THE USE OF COLOR IN TRAFFIC GUIDANCE

by John O. Elstad

Minnesota Mining and Manufacturing Co., St. Paul

5 refs

Enclosed lens reflectors function well in rainy conditions, while exposed lens reflectors become dimmer in the rain. Experiments with blue for signing and delineation of exits from freeways showed a 50% reduction in erratic movements for both day and night conditions. Tests were made in Michigan and Minnesota. The use of color in traffic guidance is a method that may effectively provide visual cues to motorists.

Search terms: Color; Reflectors; Night driving; Lenses; Traffic

markings; Michigan*; Minnesota*; Signal color; Freeways; Exits; Visibility; Traffic control devices; Rain; Wet road conditions; Brightness

AVAILABILITY: In American Assoc. for Automotive Medicine, PRE-CRASH FACTORS IN TRAFFIC SAFETY, 17-18 Oct 1968, p155-63 (HS-006 046)

HS-006 065 Fld. 2/9

WAVE THEORIES OF TRAFFIC FLOW

by Louis A. Pipes

Published in *Journal of the Franklin Institute* v280 n1 p23-41 (Jul 1965)

9 refs

Two types of mathematical models are presented to explain the "wave phenomenon" which occurs when a long line of vehicles on a crowded highway is stopped or started by a signal. The interruption of the steady flow initiates waves of stopping or starting. The first model is a car-following model and the second represents a stream of traffic on a single lane road by a compressible "traffic fluid" of density and a rate of flow. The wave phenomena predicted by these models are compared.

Search terms: Mathematical models; Car following*; Traffic flow patterns; Traffic density; Traffic volume; Traffic signals; Single lane traffic*

HS-006 066 Fld. 2/9

INTERNATIONAL EFFORT TOWARD UNIFORMITY ON ROAD SIGNS, SIGNALS, AND MARKINGS

by Jose M. Zuniga

Published in *World Highways* v20 n2 p6-11 (Feb 1969) 17 refs

Presented at 48th annual meeting, Highway Research Board, Washington, D.C., Jan. 16, 1969.

The history and future prospects of the movement to achieve road sign uniformity are outlined. Color reproductions of the signs are included. Types of signs discussed include warning signs, regulatory signs, guide and informative signs, construction and maintenance signs, road markings, and road signals.

Search terms: International aspects*; Signs (displays); Traffic signs; Directional signs; Traffic markings; Signal devices; Highway maintenance; Warning systems

HS-006 067 Fld. 2/9

OPERATIONAL EFFECTS OF AUTOMATIC RAMP CONTROL ON NETWORK TRAFFIC

by Joseph M. McDermott

Chicago Area Expressway Surveillance Project, Oak Park, Ill.

Published in *Highway Research Record* n202 pl-31 (1967) 15 refs

Report 17 of the Chicago Area Expressway Surveillance Project [CAESP] (HS-003 799). Presented at the 46th Annual Meeting of Highway Research Board.

This report summarizes the overall operational effects on both expressway and surface street traffic flow produced by an automatic control system of four entrance ramp metering devices and four supplementary informational display signs. Significantly higher and safer overall expressway operational levels are provided with this control.

Search terms: Traffic flow; Ramps; Controlled access highways; Merging traffic; Access control; Traffic congestion; Travel time; Chicago*; Traffic control devices; Accident rates; Electronic traffic control

HS-006 070 Fld. 3/4; 2/9

WRONG WAY DRIVING

Anonymous

Published in *Traffic Safety* v65 n1 pl0-1, 34-7 (Jan 1965)

A state-by state survey discusses the problems encountered on controlled access highways with drivers going the wrong way, often deliberately. Efforts being made to control this problem are chiefly by installation of additional signs.

Search terms: Driver behavior; Reckless driving; Controlled access highways; Highway signs; Wrong way*; Directional signs

2/9 Traffic Control (Cont.)

HS-006 108 Fld. 2/9

TRAFFIC COUNT CAPABILITIES OF FISCHER & PORTER TAC-DET LOOP DETECTORS AND CARD KEY SYSTEMS TRANS-SENSOR DETECTORS

by C. F. Wasser, Jr.

California. Div. of Highways, San Diego

Jun 1966 42p

Prepared in cooperation with Bureau of Public Roads, Washington, D.C.

An 8-lane freeway is used to compare operational characteristics, precision, installation problems, and costs of two traffic counting systems. Both systems were precise within 1% and were almost equal in cost. They differed in kinds of errors made, and the error patterns are discussed.

Search terms: Traffic estimates; Traffic flow; Detectors; Freeways; Traffic counters*; Costs*; Traffic surveillance*

AVAILABILITY: Corporate author

HS-006 109 Fld. 2/9

VISUAL CHARACTERISTICS OF FLASHING ROADWAY HAZARD WARNING DEVICES

by Jerry Howard; Dan M. Finch

California Univ., Berkeley. Inst. of Transportation and Traffic Engineering

11-15 Jan 1960 27 refs 16p

Prepared for presentation at the 39th annual meeting of the Highway Research Board, Washington, D.C.

The visual characteristics of flashing light sources were studied to determine their effectiveness in attracting attention and to relate the findings to the design of battery-operated portable roadway hazard warning devices. Both physical and psychological factors were considered. It is suggested that at least three flashing lights should be used to mark any hazard.

Search terms: Warning systems; Visibility; Hazards; Flashing systems; Brightness; Psychological factors; Signal color; Color,

perception*; Luminance; Visual perception

AVAILABILITY: Corporate author

HS-006 110 Fld. 2/9

A MULTIVARIATE ANALYSIS OF VEHICULAR SPEEDS ON FOUR-LANE RURAL HIGHWAYS

by Robert H. Wortman

Published in *Highway Research Record* n72 p1-18 (1965) 15 refs

Presented at the 43rd Annual Meeting of the Highway Research Board, Jan 1964.

The purpose of this investigation was to evaluate the variables present on 4-lane rural highways which represent the driver, the vehicle, the roadway, traffic conditions, and environmental characteristics. For the evaluation of the variables, mathematical models were devised for the purpose of predicting spot-speeds by use of multiple linear regression equations and factor analysis. The stream friction and the traffic stream composition factors accounted for the major portion of the variation in average speed.

Search terms: Traffic characteristics; Traffic flow; Multivariate analysis*; Highway characteristics; Mathematical models; Factor analysis*; Statistical analysis; Regression analysis*; Rural highways; Speed patterns; Forecasting; Driver-vehicle interface; Environmental factors

HS-006 111 Fld. 2/9

GAP AVAILABILITY STUDIES

by Adolf D. May, Jr.

Published in *Highway Research Record* n72 p101-36 (1965) 51 refs

Presented at the 44th Annual Meeting of the Highway Research Board, Jan 1965.

The Expressway Surveillance Project in the Chicago area is described. The immediate objective of the project is to develop, operate, and evaluate a pilot network information and control system to reduce travel time and to increase traffic flow. Development of a pilot detection system consisting of operational studies,

surveillance equipment evaluation, system design and installation was the first major phase of the project. This system will be gradually converted to a pilot network information and control system. Experience with automatic ramp metering is described.

Search terms: Gap acceptance*; Access control; Ramps; Controlled access highways; Traffic flow; Chicago*; Mathematical analysis*; Electronic traffic control; Traffic data analysis; Travel time; Statistical analysis; Headway*

HS-006 112 Fld. 2/9

ANALYSIS OF A THREE-STREET TRAFFIC SYSTEM

by Howard H. Bissell

Published in *Highway Research Record* n72 p40-57 (1965)

Presented at the 43rd Annual Meeting of the Highway Research Board, Jan 1964.

This paper indicates the changes in traffic flow characteristics in Washington, D.C., when measured on a system of three parallel streets, when the operation of the system was changed from 3 two-way streets to a one-way street on each side of the center two-way street. The center street was designed to promote bus transportation. Recently developed traffic survey and analysis techniques involving galvanic skin response studies and the traffic impedance analyzer were utilized. Results show that movement was improved for traffic traveling through the new system: travel time was reduced by 11%, there were 33% fewer stops and less driver tension.

Search terms: Traffic flow; Traffic data analysis; Traffic characteristics; Galvanic skin response*; Travel time; Traffic volume; Traffic surveys; Buses (vehicles); District of Columbia*

HS-006 113 Fld. 2/9

A METHOD FOR ESTIMATING DESIGN HOURLY TRAFFIC VOLUMES

by Joseph J. Heibl

Published in *Highway Research Record* n72 p88-100 (1965)

Presented at the 43rd Annual

2/9 Traffic Control (Cont.)

HS-006-113 (Cont.)

Meeting of the Highway Research Board, Jan 1964.

A method is described for estimating traffic volumes in the 30th highest hour from the average daily traffic at any location on state rural highways. Regression analysis is found useful in this procedure.

Search terms: Traffic flow; Peak hour traffic; Regression analysis*; Traffic volume; Traffic characteristics; Rural highways; Traffic data analysis

HS-006 117 Fld. 3/4; 2/9

DRIVER JUDGMENT AND ERROR DURING THE AMBER PERIOD AT TRAFFIC LIGHTS

by A. Crawford

Published in *Ergonomics* v5 n4 p513-32 (Oct 1962) 13 refs

The behavior of a small group of drivers who took part in an experiment on stopping at traffic lights is described. Examination of the errors, hesitations, and changes of mind suggest that the distances in which 95 percent of the drivers stopped successfully might be used as a design parameter in the calculations of the minimum amber period for a traffic light.

Search terms: Traffic signals; Signal color; Mathematical analysis*; Speed; Driving tasks; Stopping distance; Braking distance; Decision making*; Driver performance; Driver behavior

HS-006 175 Fld. 2/9; 4/7

SIMULATION OF TWO-WAY TRAFFIC ON AN ISOLATED TWO-LANE ROAD

by Paul Warnshuis

Published in *Transportation Research* v1 n1 p75-83 (May 1967)

One of the open problems in traffic flow theory is to describe the flow of two-way traffic on a two-lane road. A computer simulation has been developed in which the behavior of individual cars is modeled directly.

This paper describes this simulation and presents some numerical results obtained with it.

Search terms: Computerized simulation; Traffic dynamics; Traffic flow; Speed patterns; Two lane highways; Traffic density; Traffic simulation; Mathematical analysis*

HS-006 176 Fld. 2/9

A NEW LOOK IN FREEWAY OPERATION

by W. E. Schaefer; John West

Published in *Traffic Engineering* v39 n11 p30-1, 34-5 (Aug 1969)

Two types of freeway traffic problems are discussed: day-to-day congestion caused by built-in geometric bottlenecks and the "unusual" incident—an accident, a stalled car, a spilled load. Techniques and programs used by the Los Angeles Freeway Operation Department to combat these problems are upgrading existing freeways, ramp metering, and surveillance/control systems.

Search terms: Highway design; Freeways; Traffic surveillance*; Traffic congestion; Ramps; Access control; Traffic control devices; Helicopters; Radio communication*; Television systems; Los Angeles*; Highway characteristics; Highway maintenance; Electronic traffic control

HS-006 177 Fld. 2/9

MODELS FOR TRAFFIC ASSIGNMENT

by W. S. Jewell

Published in *Transportation Research* v1 n1 p31-46 (May 1967) 8 refs

The development of traffic models is presented, from the single route case to the multi-commodity network. Several different models are compared and difficulties and aspects needing further research pointed out. To find a unique allocation of traffic flow under "steady-feasible" conditions, it is necessary to assume either an exact time-equalization behavior of drivers when faced with choice between two routes or else inexact behavior.

Search terms: Mathematical models; Traffic capacity; Traffic

volume; Traffic flow; Driver behavior; Routes; Time factors*; Travel time; Traffic data analysis

HS-006 178 Fld. 2/9

INTERDEPENDENCE OF CERTAIN OPERATIONAL CHARACTERISTICS WITHIN A MOVING TRAFFIC STREAM

by Patrick Athol

Published in *Highway Research Record* n72 p58-87 (1965) 6 refs

Presented at the 43rd Annual Meeting of the Highway Research Board, Jan. 1964.

The Expressway Surveillance Project of Chicago is described. Electronic detectors and aerial photography are used. Lane occupancy, volume, speed, density, travel time, congestion, headway of traffic were analyzed. The requirements of a traffic control system able to control congestion were studied. Ramp metering appears useful for this purpose.

Search terms: Traffic characteristics; Traffic congestion; Ramps; Traffic lanes; Traffic control; Aerial photography*; Traffic flow; Chicago*; Travel time; Controlled access highways; Freeways; Traffic volume; Speed patterns; Headway*; Traffic counters*; Access control; Traffic data analysis; Mathematical analysis*

HS-006 179 Fld. 2/9; 4/7

A COMPARISON OF MOTORIST DELAYS FOR DIFFERENT MERGING STRATEGIES

by D. R. McNeil; J. T. Smith

Published in *Transportation Science* v3 n3 p239-54 (Aug 1969)

23 refs

Contract FH-11-6658

Compares motorist delays in the case of two merging strategies that have been widely discussed: the Miller model and the Weiss and Maradudin model. Results for both models may be obtained easily, using the results of queueing theory. Reduction in the delay achieved by inserting a traffic island between two streams of major road traffic is illustrated.

Search terms: Mathematical models; Traffic flow; Merging traf-

2/9 Traffic Control (Cont.)

HS-006-179 (Cont.)

fic; Queueing theory; Medians (dividers); Time factors*; Traffic data analysis

HS-006 201 Fld. 4/7; 2/9

CAR FOLLOWING MODELS AND THE FUNDAMENTAL DIAGRAM OF ROAD TRAFFIC

by Louis A. Pipes

Published in *Transportation Research* v1 n1 p21-9 (May 1967) 13 refs

Reviews several types of car-following models and discusses the types of fundamental diagrams that they imply. A new model which appears to have some merit is also presented. The driver's visual perception is examined to determine how he gauges his rate of approaching a vehicle he is following, and the model is based on the rate of change of the visual angle.

Search terms: Mathematical models; Car following*; Traffic flow; Traffic dynamics; Visual perception; Visibility; Following distance

HS-006 226 Fld. 2/9; 1/3

STUDY OF TRAFFIC PHENOMENA THROUGH DIGITAL SIMULATION. FINAL REPORT, 1 SEPTEMBER 1962-31 MAY 1966

by A. D. St. John

Midwest Research Inst., Kansas City, Mo.

25 Jan 1967 102p 10 refs
Grant PHS-AC-00106

Supported in part by U.S. Steel Co. and International Business Machine Corp.

Main features and results from a digital traffic simulation are presented. The simulation model, based on vehicle dynamics and human factor considerations, was developed to study accidents in the freeway environment. The simulation treats following and overtaking maneuvers including those which are accepted and imposed in weaving and merging. Some of the results show that risks are frequently imposed and accepted in weaving, merging, and

short headway driving, but infrequently become critical incidents or accidents; drivers stable under moderate conditions may become unstable under severe conditions; stable drivers compensate for erratic drivers; and projective skills are essential for the close following driver.

Search terms: Single lane traffic; Traffic simulation; Accident studies; Accident simulation; Headway; Passing (driving); Tailgating; Simulation models; Weaving traffic; Merging traffic; Freeways; Overtaking (driving); Computerized simulation; Digital computers; Gap acceptance; Driving simulation; Following distance; Deceleration; Acceleration (physics); Driver behavior; Risk taking

AVAILABILITY: Corporate author

HS-006 227 Fld. 2/9; 4/7

TRAFFIC FLOW AND BUNCHING

by R. T. Underwood

Published in *Australian Road Research* v1 n6 p8-25 (Jun 1963) 21 refs

Various traffic flow models are discussed. It is suggested that there are three distinct flow zones. Satisfactory theoretical solutions are based on an extensive queueing theory in the zone of normal flow, and based on car following theory in the zone of forced flow, the zone of unstable flow being incapable of theoretical analysis. Some results of limited bunching studies are also discussed.

Search terms: Mathematical models; Traffic flow; Traffic density; Traffic volume; Queueing theory*; Car following; Speed

HS-006 228 Fld. 2/9; 4/7

A THEORY OF THE DIFFUSION OF TRAFFIC PLATOONS

by Muriel J. Grace; Renfrey B. Potts

Published in *Operations Research* v12 n2 p255-75 (Mar-Apr 1964) 12 refs

The basic assumption of the mathematical model is a kinematical one, that the speeds of the cars in the platoon are distributed normally. The parameters of the distribution are

related to a diffusion constant that measures the spreading of the platoon. For certain assumed initial conditions, analytical and numerical solutions of the model are presented and applied to the problem of the coordination of two successive traffic lights.

Search terms: Mathematical models; Traffic flow; Traffic signals; Speed patterns; Traffic volume; Traffic density; Kinematics

HS-006 229 Fld. 2/9; 4/7

ANALYSIS OF BUNCHING IN RURAL TWO-LANE TRAFFIC

by Alan J. Miller

Published in *Operations Research* v11 n2 p236-47 (Mar-Apr 1963) 5 refs

A model is proposed for the formation of bunches in rural two-lane traffic. An overtaking rate is defined and estimated from data. Formulas are derived for the rate of delay to vehicles on rural roads caused by restricted overtaking. The model is not meant for the analysis of urban traffic.

Search terms: Rural highways; Two lane highways; Mathematical models; Traffic flow patterns; Overtaking (driving); Traffic density; Variance analysis

HS-006 230 Fld. 2/9

STUDY OF ELECTRONIC DEVICES AS TRAFFIC AIDS. ANNUAL REPORT

Ohio State Univ., Columbus. Engineering Experiment Station

Jul 1962 165p
Report no. EES-202-1

This report, with nine others, was summarized in Report EES 202-2 (Sep 1965) with same title (HS-001 419).

A research program on the use of electronic devices as traffic aids is described. The goal was to incorporate electronic devices into the highway system in order to increase traffic flow and safety. Accomplishments for that period follow: (1) progress in traffic dynamics with a view to the design of logic systems; (2) examination of the driving task in order to design electronic systems

2/9 Traffic Control (Cont.)

HS-006-230 (Cont.)

and (3) a study of electronic control devices investigating possible use in various highway accident situations and under various degrees of application.

Search terms: Traffic flow; Electronic traffic control; Computerized simulation; Mathematical models; Car following; Passing (driving); Driver behavior; Traffic dynamics; Driving tasks; Systems analysis; Traffic control devices; Driver-vehicle interface

AVAILABILITY: Corporate author

HS-006 236 Fld. 4/7; 2/9

QUEUES

by Martin A. Leibowitz

Published in *Scientific American* v219 n2 p96-103 (Aug 1968)

Queueing theory is explained as it relates to many areas including highways and traffic density. Mathematical analysis of queues suggests ways to shorten the waiting lines.

Search terms: Queueing theory; Traffic flow; Traffic density; Traffic congestion; Mathematical analysis

HS-006 242 Fld. 5/0; 2/9; 5/1; 5/20

TRUCK DOWNHILL CONTROL—PREDICTION PROCEDURE

by Paul G. Hykes

Budd Co., Philadelphia, Pa.

Jan 1963

Report no. SAE-630A

Presented at SAE Automotive Engineering Congress, Detroit.

A unique method is presented by which safe speeds for descent of mountain grades by commercial vehicles may be predicted. Formulas and charts to permit implementation are presented with test results to prove validity. A suggested method for the uniform rating and posting of mountain grades is also included in the interest of public safety.

Search terms: Forecasting; Slopes; Trucks; Speed control; Mathematical analysis; Performance characteristics; Speed studies; Com-

mercial vehicles; Road grades; Braking techniques; Driving conditions; Rolling resistance

AVAILABILITY: In Society of Automotive Engineers, HIGHWAY VEHICLE SAFETY, 1968, p56-67 (HS-006 239)

HS-006 252 Fld. 5/0; 2/9; 3/4

OBJECTIVE MEASUREMENTS OF DRIVER BEHAVIOR

by Bruce D. Greenshields; Fletcher N. Platt

Michigan Univ., Ann Arbor. Transportation Inst.; Ford Motor Co., Dearborn, Mich. Traffic Safety and Highway Improvement Dept.

Jan 1964 13 refs

Report no. SAE-640161 (809A)

Presented at SAE Automotive Engineering Congress, Detroit.

The development of an index of traffic flow is described, based on traffic density and volume, gasoline consumption, accident frequency. Equipment used to measure traffic flow is discussed. The application of this equipment to objective measurement of driver behavior, vehicle motion, and highway environment is described. This "drivometer" has been used to study driver education and performance, effects of fatigue, and driver classification.

Search terms: Measuring instruments; Driver behavior; Driver-vehicle interface; Traffic flow; Motion; Driver characteristics; Highway characteristics; Driving conditions; Mathematical analysis; Driver education; Traffic density; Traffic volume; Fuel consumption; Accident rates; Driver fatigue; Driver performance

AVAILABILITY: In Society of Automotive Engineers, HIGHWAY VEHICLE SAFETY, 1968, p277-89 (HS-006 239)

HS-006 280 Fld. 2/9

WHERE DO WE STAND ON UNIFORM CONTROL DEVICES? WE'RE MAKING PROGRESS; SECONDARY ROADS ARE A REAL CHALLENGE

by Rex M. Whitton; Howard Pyle

Published in *Traffic Safety* v62 n2 p12-4, 36, 39-40 (Feb 1963)

Outlines what the states are doing to achieve uniformity in traffic control devices. The needs of the secondary roads, which are sometimes forgotten, are discussed. Uniformity standards are based on the Manual on Uniform Traffic Control Devices for Streets and Highways.

Search terms: Traffic control devices; Secondary highways; State government; Traffic signs; Manual on Uniform Traffic Control Devices for Streets and Highways; Highway signs; Standardization

HS-006 281 Fld. 2/9

THE PROFITABILITY OF TRAFFIC LIGHTS

by Uno Hernroth

Published in *Traffic Quarterly* v19 n3 p428-34 (Jul 1965)

The control and supervision of traffic in cities presents problems in labor allocation and high costs. The decrease in police work achieved through traffic signal control has not been considered sufficiently. This article discusses the problems and possibilities of modern traffic light control by police personnel. Tests made in Gothenburg show that traffic capacity can be increased by 20% by use of police personnel. Traffic accident costs are also reduced.

Search terms: Police traffic services; Traffic flow; Traffic capacity; Traffic signals; Intersections; Sweden*; Benefit cost analysis; Traffic control devices; Accident rates

HS-006 282 Fld. 2/9; 2/4

REFLECTIVE DEVICES AS AIDS TO NIGHT DRIVING

by J. A. Reid; J. W. Tyler

Published in *Highways and Traffic Engineering* v37 n1715 p34-42 (Jul 1969) 9 refs

Light may be reflected in three ways: direct, diffuse, or reflex. As aids to night driving the following types of reflective devices are discussed: reflective road signs, curbs, road and edge markings, and road studs. This article considers remedial treatment, assessments of reflecting devices, brightness measurements, and factors

2/9 Traffic Control (Cont.)

HS-006-282 (Cont.)

causing temporary loss of reflectivity.

Search terms: Reflecting surfaces; Traffic markings; Traffic signs; Night driving; Visibility; Brightness; Highway signs; Curbs

HS-006 283 Fld. 2/9

EFFECT OF CONTROL DEVICES ON TRAFFIC OPERATIONS. INTERIM REPORT

De Leuw, Cather and Co., Chicago, Ill.

1964 119p 424 refs
Report no. NCHRP-11; NAS-NRC-Pub-1210

For Final report see HS-001 289.

The purpose of this project is to study the effect of control devices on operation of individual intersections and the surrounding street system to gain information useful in placing these controls. The first stage of the study derived relationships concerning intersection operation with "stop" and "yield" signs. The study was made in suburban Chicago. The effects of the signs on intersection operation and on operation along a traffic corridor are discussed.

Search terms: Traffic control devices; Traffic signs; Traffic flow; Intersections; Headway; Accident rates; Chicago; Suburban areas; Stop signs; Yield signs; Speed patterns; Time factors; Traffic volume; Travel time; Gap acceptance

AVAILABILITY: HRB

HS-006 284 Fld. 2/9

EVALUATION OF DELAYS AND ACCIDENTS AT INTERSECTIONS TO WARRANT CONSTRUCTION OF A MEDIAN LANE

by Robert B. Shaw; Harold L. Michael

Published in *Highway Research Record* n257 p17-33 (1968) 12 refs

Objective of the study was to evaluate conditions under which the construction and maintenance costs for a median lane would be warranted at suburban and rural intersection approaches. Delay times and accident rates caused by left-turning vehicles

were analyzed at intersections with and without median lanes. Intersection approaches with median lanes had a substantial reduction of accidents attributed to left turning.

Search terms: Turning left; Intersections; Medians (dividers); Accident prevention; Accident rates; Indiana; Benefit cost analysis; Suburban areas; Rural highways; Time factors; Highway construction

HS-006 285 Fld. 2/9

THIRD GENERATION DESTINATION SIGNING—AN ELECTRONIC ROUTE GUIDANCE SYSTEM

by B. W. Stephens; D. A. Rosen; F. J. Mammano; W. L. Gibbs

Published in *Public Roads* v35 n9 p193-200, 212 (Aug 1969) 32 refs

Presented at 48th annual meeting of the Highway Research Board, Washington, D.C., Jan. 1969.

The problem of routing an automobile driver safely and efficiently from his origin to his destination is analyzed and present highway routing and navigational methods are examined in the framework of a systems analysis of the highway routing subsystem. Techniques of communication that can remove system constraints are considered, and a route-guidance-system concept and a plan for implementing it are presented.

Search terms: Directional signs; Traffic signs; Electronic devices; Highway signs; Routes; Communication systems; Electronic Route Guidance System; Systems analysis; Automatic control; Highway communication

HS-006 286 Fld. 2/9; 4/7

THE USE OF THE FLUX PLOT IN TRAFFIC CONTROL

by Robert J. Wheeler; Elmer M. Tory

Published in *Traffic Quarterly* v19 n3 p369-83 (Jul 1965) 16 refs

Discusses the use of experimental volume-concentration relationships in the study and prevention or limitation of kinematic waves in a number of common traffic situations: merging and diverging, flow, speed, capacity.

Search terms: Traffic flow pat-

terns; Speed patterns; Traffic capacity; Merging traffic; Mathematical models; Traffic dynamics; Traffic density; Traffic volume; Traffic control; Traffic data analysis; Kinematics

HS-006 287 Fld. 2/9; 4/2

PUBLIC SUPPORT FOR UNIFORM TRAFFIC SIGNS, SIGNALS AND MARKINGS

Anonymous

Published in *Traffic Engineering* v33 n5 p31-6, 38, 40 (Feb 1963)

The Manual on Uniform Traffic Control Devices for Streets and Highways is discussed. The need for uniformity; cooperation among communities and local, state, and federal government; responsibility for maintenance of traffic control devices; and future needs are discussed.

Search terms: Traffic signs; Traffic signals; Community support; Traffic control devices; Manual on Uniform Traffic Control; Devices for Streets and Highways; Traffic markings; Standardization; Local government; State government; United States Government

HS-006 305 Fld. 3/11; 2/9

P E D E S T R I A N F L O W CHARACTERISTICS

by Francis P. D. Navin; R. J. Wheeler

Published in *Traffic Engineering* v19 n7 p30-3, 36 (Jun 1969) 7 refs

The effects of two-way pedestrian flow on the capacity of a sidewalk were measured and mathematically modeled. In this study, time lapse color photographs of the test section were taken from elevated fixed positions. This will aid in the prediction of routes and peak flows providing for economical pedestrian facility construction. Scope of the study included sidewalk proportioning, location and width requirements for a lane, walking speeds for men and women, and speed-concentration relationship.

Search terms: Mathematical models; Pedestrian characteristics; Traffic flow patterns; Traffic capacity; Sidewalks; Photography; Speed patterns

2/9 Traffic Control (Cont.)

HS-006 311 Fld. 4/7; 2/9; 3/4

CONTRIBUTION TO THE MATHEMATICAL BIOPHYSICS OF AUTOMOBILE DRIVING

by N. Rashevsky

Published in *Bulletin of Mathematical Biophysics* v23 p19-29 (1961)

Traffic in one direction on a multi-lane highway in heavy traffic is considered, and a general expression for the number of cars which pass a car travelling at a given velocity, as well as the number of cars which the given car passes, is derived for the case when the speeds of different cars are distributed in some arbitrary manner. Closed expressions are derived and discussed for a rectangular distribution. Each passing by another car or of another car is considered as a distracting stimulus which affects the reaction times of the driver. Using previously derived expressions for the safe speed as a function of reaction times, expressions for the safe average speed are derived, in terms of the volume of traffic and of the spread of the distribution of speeds.

Search terms: Passing (driving); Reaction time; Traffic volume; Traffic flow; Biomathematics; Speed patterns; Mathematical analysis; Driver behavior; Driving conditions; Biophysics

HS-006 335 Fld. 2/9

HEADWAY GROUPINGS

by Patrick Athol

Published in *Highway Research Record* n72 p137-55 (1965)

Presented at the 44th Annual Meeting of the Highway Research Board, Jan 1965.

Data analyzed are primarily time headways, the elapsed time between the leading edges of successive vehicles. The intent of the analysis is to go beyond the curve-fitting stage of headway distributions and use instead these headway measurements to understand the behavior of the traffic in terms of its component parts. The search for one distribution to suit all these conditions tends to smooth out the differences, rather than acknowledge their presence.

These differences are reviewed here in greater detail.

Search terms: Headway; Traffic flow patterns; Traffic congestion; Mathematical models; Traffic characteristics; Traffic data analysis; Time factors; Traffic capacity; Traffic volume

HS-006 336 Fld. 2/9

HARBOR FREEWAY RAMP CLOSURE

by Roger T. Johnson

California. Div. of Highways, Sacramento

Apr 1967 30p

Report no. PB 180 228

The effect of ramp closure on traffic of a freeway and an adjacent arterial street in Los Angeles are evaluated. The chosen location experienced congestion and accident problems during peak hour traffic due to additional demand and poor geometric design. The closure resulted in improvement of traffic flow on the freeway without seriously affecting the operation of the arterial.

Search terms: Freeways; Los Angeles; Peak hour traffic; Traffic data analysis; Ramps; Merging traffic; Traffic congestion; Aerial photography; Traffic flow; Traffic volume; Access control; Travel time

AVAILABILITY: CFSTI as PB 180 228

HS-006 337 Fld. 2/9

DIGITAL-COMPUTER CONTROLLED TRAFFIC SIGNAL SYSTEM FOR A SMALL CITY

by Morton I. Weinberg; Harvey Goldstein; Terence J. McDade; Robert H. Wahlen

Cornell Aeronautical Lab., Inc., Buffalo, N.Y.

1966 94p 71 refs

Report no. NCHRP-29; NAS-NRC-Pub-1474

Research on a traffic control system for an urban street complex was done in White Plains, New York. Equations were developed for assignment of right of way at intersections that would result in minimum delay. Detectors were used for traffic surveillance. The computer equipment,

costs, and timing of traffic signals are described.

Search terms: Digital computers; Streets; Traffic signals; Traffic flow; Detectors; Mathematical models; Costs; Urban highways; Traffic control; Intersections; Time factors; Traffic surveillance; Traffic counters; New York (state)

AVAILABILITY: From HRB

HS-006 338 Fld. 2/9

A PULSED DOPPLER RADAR EXPERIMENT FOR HIGHWAY TRAFFIC RESEARCH, FINAL REPORT.

by R. F. Schneeberger; R. A. Hayman; L. A. Picciano

Cornell Aeronautical Lab., Inc., Buffalo, N.Y.

Mar 1969 38p 6 refs

Report no. CAL-UM-2713-E-1

The capabilities of pulsed Doppler radar for the measurement of some of the traffic flow variables were examined. Doppler measurements were made to determine vehicle speed and speed distributions for vehicles passing through the range gate. Small velocity differences and distribution of instantaneous speed could be observed. Parameters in the current statistical methods of traffic flow analysis could also be measured.

Search terms: Radar; Traffic flow patterns; Traffic dynamics; Traffic data analysis; Pulse doppler radar; Parameters

AVAILABILITY: Corporate author

HS-006 339 Fld. 2/9

THE ANALOG TRAFFIC SIGNAL MODEL

by Nathan C. Ficklin; Walter E. Pontier

Published in *Traffic Engineering* v39 n12 p54-8 (Sep 1969)

A model used for time-space diagramming makes the interacting influences of the entire traffic network visible to the traffic engineer. A map of the study area is glued to a 4 by 10 foot piece of plywood. Strings and other devices used on the model

2/9 Traffic Control (Cont.)

HS-006 339 (Cont.)

are described. The model is particularly helpful for diagramming a densely signalized area such as a downtown business district.

Search terms: Central business districts; Traffic signal networks; Models; Traffic signals; Traffic engineering; Maps

HS-006 340 Fld. 2/9

THE TORONTO SYSTEM: INTERSECTION EVALUATION AND CONTROL

by Douglas W. Whitehead

Published in *Traffic Engineering* v39 n12 p28-30 (Sep 1969)

A computerized system for control of some 700 intersections, using about 500 detectors, is described. The method for intersection evaluation is based on detection of a queue of vehicles. Methods by which congestion is calculated are outlined. The most successful traffic control method is a constant cycle length variable split mode, called TR2, and its operation is discussed.

Search terms: Toronto; Intersections; Traffic control; Traffic congestion; Electronic traffic control; Queueing theory; Time factors; Detectors; Traffic counters; Mathematical analysis

HS-006 341 Fld. 2/9

TEMPORARY TRAFFIC SAFETY SIGNS ARE INSTANTLY INSTALLABLE

by William B. Mitchell

Published in *Screen Printing* v9 n4 p24-5, 53 (Apr 1969)

Screen printed "Saf-T-Cones" collapse or bounce out of the way undamaged if run over accidentally. Manufacturing processes for making the cones and signs are described.

Search terms: Cones; Signs (displays); Traffic control devices

HS-006 359 Fld. 4/5; 2/9

COLLECTING AND ANALYSING TRAFFIC DATA AUTOMATICALLY

by H. J. Wootton

Published in *Traffic Engineering and Control* v4 n10 p559-63 (Feb 1963)

Many traffic studies require information about vehicle flow, speed, direction of travel, and class of vehicle. No equipment has been available for recording such information automatically, but from the time pattern a vehicle creates in crossing two closely spaced detectors, it is possible to determine the information required. A method is outlined for recording such information with detectors. The computer and programs used to analyze the data are described.

Search terms: Traffic flow patterns; Detectors; Computers; Traffic data analysis; Peak hour traffic; Speed patterns; Data processing; Computer programs; Time factors; Travel patterns

HS-006 361 Fld. 4/7; 2/9

NON-INTEGGER CAR FOLLOWING MODELS

by Adolf D. May; Hartmut E. M. Keller

California Univ., Berkeley. Inst. of Transportation and Traffic Engineering

1965 38p 13 refs

This paper gives background data on microscopic and macroscopic approaches to traffic problems. The microscopic approach is sometimes referred to as the car following theory and takes as its elements individual vehicular spacing and speed. The macroscopic approach deals with traffic stream flows, densities, and average speeds. Analytical techniques for evaluating various theories on basis of experimental data are included.

Search terms: Traffic flow patterns; Mathematical models; Car following; Traffic density; Traffic dynamics; Speed patterns; Following distance; Headway; Traffic data analysis

AVAILABILITY: Corporate Author

HS-800 166 Fld. 1/3; 2/9

SPEED AND ACCIDENTS. 1. INTERIM REPORT

Research Triangle Inst., Durham

11 Jul 1969 147p

Contract FH-11-6965; PB-186

It may be that accidents should be blamed not on absolute vehicle speed but on the extent to which accident-involved vehicles differ from the average speed surrounding traffic flow. The hypothesis tested in this study is that a relationship exists between involvement rate and speed difference from average surrounding traffic. Accident and speed data in 100,000 speed observations were studied. Digital computer detectors, and methods used in the study are described. More than 73 accidents involved. The hypothesis studied appeared valid.

Search terms: Accident factors; Speed; Traffic flow patterns; Mathematical analysis; Accident involvement; Accident data; Digital computer; Detectors; Speed studies; Rates; Indiana; Accident studies; Accident

AVAILABILITY: CFSTI as 229

HS-006 386 Fld. 1/3; 2/9

TRAFFIC ENGINEER'S APPROACH TO ROAD ACCIDENTS

by J. J. Leeming

Published in *Traffic Engineering and Control* v4 n5 p277,9 (Sep 1962)

Traffic engineers seek to prevent road accidents in practical terms, considering four interacting factors: human nature, the law, the vehicle, and the road. Although pure engineering works are the most effective in stopping accidents, and legal measures are less effective, traffic engineers must be educated to want to prevent accidents not merely to call for additional penalties on motorists.

Search terms: Community; Traffic engineering; Accident prevention; Great Britain; Laws; Highway safety; Driver education; Motor vehicle safety

2/9 Traffic Control (Cont.)

HS-006 389 Fld. 2/9

CONTROL OF OVERSATURATED INTERSECTIONS

by D. H. Green

Published in *Operational Research Quarterly* v18 n2 p161-73 (Jun 1967)
6 refs

Simulation experiments with control policies developed for stable regimes are described. The policies are compared with other suggested procedures when employed during oversaturated periods and were found to remain effective with respect to mean delay per vehicle. The problem of reducing the maximum individual delay may be tackled by imposing a maximum phase duration during extreme congestion.

Search terms: Traffic congestion; Peak hour traffic; Traffic control; Time factors; Traffic simulation; Intersections; Traffic capacity; Traffic signals; Mathematical analysis

HS-006 390 Fld. 2/9

LIMITATIONS OF PHASE OVERLAP SIGNALIZATION FOR TWO-LEVEL DIAMOND INTERCHANGES

by Donald L. Woods

Published in *Traffic Engineering* v39 n12 p38-41 (Sep 1969) 6 refs

Limitations discussed are: length of overlap, spacing of intersections, minimum phase and cycle length, minimum critical lane approach volume, left turn storage and capacity, and turn volume. In spite of these limitations, the phase overlap signal system should be used when the basic problem is one of capacity and when the other limitations are met.

Search terms: Traffic control; Traffic signals; Traffic capacity; Intersections; Traffic volume; Turning left; Time factors

HS-006 391 Fld. 2/9

CARRIAGEWAY MARKING TESTS IN THE U.S.S.R.

by Valentin V. Silyanov

Published in *Traffic Engineering and Control* p409-12 (Dec 1968)

While traffic is growing at the rate of 11-14% a year, the growth of the paved road system is only about 4% a year. It is essential to develop methods and techniques to raise the traffic capacity of the existing road network, especially for areas with high traffic intensity. Pavement marking is effective for this purpose. Road sections are chosen for marking on the basis of their "accident coefficient." It is particularly valuable to mark long ascents and descents.

Search terms: Traffic markings; Accident prevention; USSR; Reduced visibility; Climbing lanes; Highway design; Road grades; Traffic volume; Rural highways; Accident location; Traffic lanes; Traffic capacity

HS-006 453 Fld. 2/9

KEEPING THE MOTORIST ON COURSE

by Edmund R. Ricker

Published in *Traffic Engineering and Control* v4 n7 p406-7, 417 (Nov 1962) 5 refs

Results of several edgeline projects are briefly described. Although dashed edgemarkings had been used, most states use the solid line. The value of edgemarking is well demonstrated by keeping the motorist on course. Paving of road shoulders is recommended. Suggested standards for edgemarkings are that they should be white, four inches wide, near the edge of the pavement, solid, and reflectorized.

Search terms: Road shoulders; Traffic markings; Highway design; Visibility; Design standards

HS-006 454 Fld. 2/9

TRAFFIC CONTROL

by Robert L. Morris

Published in *Nation's Cities* v7 n1 p16-9 (Jan 1969)

Computers, electronic monitors, and television are just a few of the sophisticated devices being used to help motorists. This article discusses traditional control devices, electronically controlled signal systems,

electronic signing, the "traffic pacer" to indicate desirable speed, variations on the one-way street, air borne police traffic spotters, devices for direct communication with the driver inside his car, emergency call boxes, ramp metering, gap detection, and remote surveillance by television and helicopter

Search terms: Helicopters; Freeways; Traffic control devices; Highway communication; Traffic signs; Computers; Electronic devices; Television systems; Ramps; Access control; Automatic control; Telephones; Traffic surveillance; Police traffic services; Traffic signals; Speed patterns; One way streets; Communication system

HS-006 455 Fld. 2/9

TRAFFIC SURVEY ANALYSIS BY ELECTRONIC COMPUTER

by V. E. Miller

Published in *Traffic Engineering and Control* v4 n12 p657-62 (Apr 1963)
14 refs

Describes in general terms various methods used to analyze traffic surveys using electronic computers at the IBM Data Centre in London. Applications of these methods of Manchester's traffic survey are given.

Search terms: Traffic surveys; Great Britain; Computers; London; Traffic planning; Traffic flow patterns; Traffic data analysis; Computer programs

HS-006 469 Fld. 3/12; 2/9

THE CONSPICUITY OF TRAFFIC SIGNS AND FACTORS AFFECTING IT

by Kari Eklund

Central Organisation for Traffic Safety in Finland, Helsinki (Finland)
1968 39p 60 refs
Report no. TALJA-6

Bound with *its* EFFECT OF POLICE SUPERVISION ON THE PERCEPTION OF TRAFFIC SIGNS AND DRIVING HABITS.

The objective of the study was to clarify three problems: the differences between various traffic signs in regard to conspicuity and the causes of differences; what factors affect the

2/9 Traffic Control (Cont.)

HS-006 469 (Cont.)

perception of traffic signs; and in what way the perception of traffic signs depends upon time. The intention was to find the correlation between visual stimulus contents and sign perception and to find what factors affect variations in vigilance. Good sign conspicuity was found to be related to brightness, simplicity, difference from other signs, frequency of use on the road, and importance of information given.

Search terms: Traffic signs; Visibility; Visual perception; Laboratory tests; Brightness; Finland; Color; Signs (displays); Psychological factors; Time factors

AVAILABILITY: Corporate author (Bound with HS-006 470)

HS-006 470 Fld. 3/12; 2/8; 2/9; 3/4 EFFECT OF POLICE SUPERVISION ON THE PERCEPTION OF TRAFFIC SIGNS AND DRIVING HABITS

by Matti Syvanen

Central Organisation for Traffic Safety in Finland, Helsinki (Finland)

1968 27p 11 refs

Report no. TALJA-6

Bound with THE CONSPICUITY OF TRAFFIC SIGNS AND FACTORS AFFECTING IT, p35-57.

The effects of police supervision on driver perception of a traffic sign were studied. If a police car was parked near the traffic sign, drivers observed the car but only 29.2% observed the sign. If the car was parked further from the sign, 52.% of drivers noticed the sign. Other aspects of the influence of police supervision on driver behavior are also discussed. Presence of a patrol car causes a decrease in poor driving habits.

Search terms: Police traffic services; Finland; Driver behavior; Visual perception; Traffic signs; Traffic surveillance; Police cars; Careless driving

AVAILABILITY: Corporate author (Bound with HS-006 469)

HS-006 494 Fld. 1/3; 4/7; 2/9

STUDY OF AUTOMOBILE ACCIDENTS THROUGH DIGITAL SIMULATION

by A. D. St. John

Midwest Research Inst., Kansas City, Mo.

1968 11p 8 refs

Grant PHS-AC-00106

Report no. SAE-680173

Presented at SAE's Analysis and Control of Traffic Flow Symposium, Detroit, Jan 9-10, 1968 and published in the CONFERENCE PROCEEDINGS, p66-76.

Simulation has been developed for following, overtaking, and merging on freeways. Parameters were chosen to correspond with human factor data and traffic measurements. The purpose was to study freeway accidents. Results imply that risks are taken with fairly high frequency while associated accidents occur at low frequency and require a simultaneous precipitating event. Some guides to the vulnerability of driver types and to the accident potentials of frequently occurring situations are given.

Search terms: Traffic flow; Computerized simulation; Accident causes; Car following; Merging traffic; Mathematical models; Overtaking (driving); Driver behavior; Driving tasks; Freeways; Risk taking; Driving simulation; Traffic simulation; Driver characteristics

AVAILABILITY: SAE

HS-006 495 Fld. 1/3; 2/9

RELATIONSHIP OF ACCIDENT RATES AND ACCIDENT INVOLVEMENTS WITH HOURLY VOLUMES

by David W. Gwynn

Published in *Traffic Quarterly* v21 p407-18 (Jul 1967) 6 refs

The relationship of accident rate to hourly traffic volume was studied in Newark. During the study period there were 1,305 accidents, of which four produced fatalities; there were 861 persons injured. It was concluded that the higher total accident rates occur in the low and high hourly volume ranges; the passenger car accident rates approximate the same,

trend as the total accident rates; the truck accident rates follow no set trend but fall below passenger car accident rates; injury rates were similar to total accident rates; for the entire range of hourly volumes, trucks are involved in lower and passenger cars higher accident percentages than their percent of the traffic stream.

Search terms: Truck accidents; Fatalities; Injury factors; Accident rates; Traffic volume; Newark; Accident investigation; Accident studies; Accident factors; Automobile accidents

HS-006 504 Fld. 2/9; 4/7

A GENERAL PURPOSE DIGITAL TRAFFIC SIMULATOR

by A. M. Blum

International Business Machines Corp., Chicago, Ill.

1968 16p 9 refs

Report no. SAE-680167

Presented at SAE's Analysis and Control of Traffic Flow Symposium, Detroit, Jan 9-10, 1968, and published in the CONFERENCE PROCEEDINGS, p10-25.

The described vehicle traffic simulator is designed to facilitate analysis of traffic flow and to experiment with postulated traffic control systems. It offers a large amount of flexibility in specifying network, intersection, vehicle, and control parameters. Vehicles may change lanes, turn, change velocity, and merge. Inputs may be varied, turns may be eliminated, and vehicles may be routed through the network. The model can be used in the simulation of single intersections, arterial routes, grid networks, and throughways.

Search terms: Computerized simulation; Traffic flow; Computer programs; Intersections; Mathematical models; Digital computers; Traffic simulation; Traffic control; Speed; Turning (direction change); Lane changing; Merging traffic

AVAILABILITY: SAE

HS-006 505 Fld. 2/9

EDGE MARKINGS FOR ROADS WITH FLUSH SHOULDERS

2/9 Traffic Control (Cont.)

HS-006 505 (Cont.)

by A. W. Christie; J. A. Reid; K. S. Rutley; A. E. Walker

Published in *Traffic Engineering and Control* v4 n9 pp500-4, 509 (Jan 1963)

Various types of edgemarkings were examined and tested to determine which would be most suitable in wet weather, at night, and in fog. Luminance and visibility at night and the effectiveness of warning by vibration are described. Markings with vertical or near-vertical facets are recommended for full-scale trials. None of the markings tested will be effective after heavy snow.

Search terms: Road shoulders; Traffic markings; Visibility; Night vision; Luminance Vibration; Warning systems; Wet road conditions; Fog; Great Britain; Reflecting surfaces; Snow

HS-006 506 Fld. 2/9; 4/7

SIMULATION OF TRAFFIC AT A FOUR-WAY STOP INTERSECTION

by Paul H. Wright

Georgia Inst. of Tech., Atlanta

1968 9p. 12 refs

Report no. SAE-680170

Presented at SAE's Analysis and Control of Traffic Flow Symposium, Detroit, Jan 9-10, 1968, and published in the CONFERENCE PROCEEDINGS, p44-52.

This paper reports the results of research in which a four-way stop intersection was simulated on a digital computer. Inputs to the program were based on field studies at three intersections in metropolitan Atlanta using mathematical models and Monte Carlo techniques. The simulation model was used to study effectiveness of the four-way stop at various approach volumes and turning movement combination. Results are given by graphs showing the relationship between traffic volumes and average delay, per cent delayed, and average queue length.

Search terms: Intersections; Stop signs; Computerized simulation;

Traffic flow; Queueing theory; Traffic volume; Mathematical models; Turning (direction change); Digital computers; Atlanta; Monte Carlo method; Time factors; Traffic simulation

AVAILABILITY: SAE

HS-006 507 Fld. 2/9; 4/7

APPLICATION OF COMPUTER SIMULATION TO THE STUDY OF TRAFFIC SIGNAL SYSTEM OPERATION

by Frederick A. Wagner, Jr.; Daniel L. Gerlough

Planning Research Corp., Los Angeles, Calif.

1968 13p 10 refs

Contract CPR-11-2806

Report no. SAE-680168

Presented at SAE's Analysis and Control of Traffic Flow Symposium, Detroit, Jan 9-10, 1968, and published in the CONFERENCE PROCEEDINGS, p26-38.

Two digital computer simulation models of traffic operation and control have been developed—a microscopic single, signalized intersection model, and a macroscopic signalized intersection network model. The paper describes the general features of the simulation models, presents summary data pertaining to the validity of the models, and briefly reviews research results from studies of traffic signal system operation made with the models.

Search terms: Traffic flow; Computerized simulation; Mathematical models; Traffic control; Intersections; Road networks; Traffic signal networks; Fortran; Digital computers

AVAILABILITY: SAE

HS-006 508 Fld. 2/9

FREEWAY RAMP CONTROL—WHAT IT CAN AND CANNOT DO

by Leonard Newman; Alex Dunnet; Gerald J. Meis

Published in *Traffic Engineering* v19 n7 p14-21 (Jun 1969)

Ramp metering on the Los Angeles freeway system is discussed. While ramp control will reduce congestion,

it rarely increases freeway capacity and is not a substitute for new freeways. Methods of control are described. Seven conclusions on the results of ramp metering are presented.

Search terms: Access control; Ramps; Freeways; Los Angeles; Traffic congestion; Traffic control; Traffic capacity; Electronic traffic control

HS-006 509 Fld. 2/9; 1/3

SIMPLE RAMP METERING DEVICE REDUCES REAR-END COLLISIONS

by Joe M. Thomas

Published in *Traffic Engineering* v19 n7 p22-5 (Jun 1969)

Rear-end collisions on an Atlanta freeway have been reduced almost 90% over a 12-month period by ramp metering. Signs were tried but were not sufficiently observed and were replaced by traffic signals, detectors, and signs. In addition to the accident reduction, volume was increased. The signal has been well observed.

Search terms: Access control; Ramps; Accident prevention; Detectors; Signs (displays); Traffic volume; Rear end collisions; Atlanta; Freeways; Accident rates; Driver behavior; Traffic control devices

HS-006 510 Fld. 2/9

SPEEDS OF CARS ON SHARP HORIZONTAL CURVES

by J. Emmerson

Published in *Traffic Engineering and Control* v11 n3 p135-7 (Jul 1969) 9 refs

Distribution of car speeds on horizontal curves is of interest for comparison with the theoretical speeds for which the curves have been designed. The speeds of cars were measured at six curves, using radar speedmeters concealed from the view of drivers. Side-friction factors were calculated for each site and were found to vary with the radius of the curve.

Search terms: Road design speed; Speed patterns; Speed studies; Road curves; Radar; Mathematical analysis; Side friction (traffic flow)

2/9 Traffic Control (Cont.)

HS-006-510 (Cont.)

cure-alls. Another common inadequacy was the lack of proper channelization devices at intersections.

Search terms: Connecticut; Accident locations; Accident types; Highway design; Intersections; Interstate Highway System; Spot Improvement Program; Accident data; Highway safety; Traffic signals; Computer programs; Highway safety; Traffic control devices; Channelized intersections

AVAILABILITY: Corporate author

HS-006 559 Fld. 2/9

ON FLOW WITHIN PLATOONS

by A. Daou

Published in *Australian Road Research* v2 n7 p4-13 (Mar 1966) 8 refs

The headway of a vehicle in a platoon on a single lane roadway can be considered as a random variable whose expected value is a function of velocity. Data from the Holland Tunnel strongly suggest that the mean headway can be represented as a linear function of velocity, and the distribution about the mean is log-normal. In addition to describing platoon headways, the log-normal distribution allows a significance level for classifying vehicles as platoon members or non-members to be set up.

Search terms: Headway; Vehicle platoons; Single lane traffic; Variables; Speed; Tunnels; Mathematical analysis; Traffic flow patterns

HS-006 560 Fld. 2/9

TRAFFIC THEORY AND PRACTICE: SOME CURRENT TRENDS

by P. G. Pak-Poy

Published in *Traffic Engineering* v34 n3 p25-35 (Dec 1963) 25 refs

An outline of some of the theoretical aspects of traffic engineering and their practical applications and importance are discussed. The paper describes the history and development of the traffic engineering pro-

fession and discusses the various theoretical approaches that are being made by the engineer, the operations research scientist and the statistician to explain various traffic phenomena. Examples demonstrating current methods of overcoming practical problems are included.

Search terms: Traffic engineering; Stochastic processes; Queueing theory; Car following; Road networks; Traffic flow; Traffic dynamics; Simulation models; Intersections; Traffic signal networks; Channelized intersections; Traffic simulation

HS-006 561 Fld. 2/9; 3/4

TRAFFIC STUDIES AT UNCONTROLLED INTERSECTIONS USING TIME-LAPSE CINEMATOGRAPHY

by R. White

Published in *Journal of Institution of Municipal Engineers* v93 n9 p312-18 (Sep 1966)

Distribution of time lags accepted and time lags and gaps rejected by drivers entering intersections is discussed. At least 80% of drivers require a gap of three seconds in city conditions when the average speed on the main road is below 30 mph. The range of values from minimum to the value acceptable to at least 85% of drivers might be taken as 11 seconds. The smaller ranges are applied to favorable conditions and the higher to the least favorable conditions of visibility and approach angle.

Search terms: Gap acceptance; Time factors; Intersections; Speed; Driver behavior; Driving conditions; Visibility; Cinematography; Mathematical analysis

HS-006 562 Fld. 2/9; 4/7

SIMULATION OF A TRAFFIC NETWORK

by Jesse H. Katz

Published in *Communications of the ACM* v6 n8 p480-6 (Aug 1963) 5 refs

A traffic network simulator for the District of Columbia is described. In this model a traffic network is considered to consist of a set of links, each with a traffic signal associated. Links are of three types: input,

feeding traffic into the network; network, carrying traffic from one intersection to another; and output, removing traffic from the network.

Search terms: Mathematical models; Intersections; Traffic signal networks; Traffic flow patterns; District of Columbia; Simulation models; Traffic simulation

HS-006 563 Fld. 2/9

A "TOPICS" PROGRAM FOR WOONSOCKET

by Joseph Arruda; Francis Dutra, David Rosenfield

Published in *Traffic Engineering* v38 n8 p48-54 (May 1968)

TOPICS (traffic operations program to increase capacity and safety) is meant to provide federal aid to states and communities for financing improvements to local streets. Woonsocket, Rhode Island, has been selected as a pilot city. Methods used for analyzing its traffic problems and recommending improvements are discussed. The street system was analyzed from a traffic capacity and safety point of view.

Search terms: Federal aid; Rhode Island; Streets; Traffic capacity; Traffic characteristics; Financing; Traffic data analysis; Transportation planning; Intersections

HS-006 564 Fld. 2/9

NEW LANE CONTROLS IMPROVE TRAFFIC FLOW

by William E. Tipton

Published in *Rural & Urban Roads* v7 n6 p34-35, 44 (Jun 1969)

Better traffic operations in Memphis have resulted from a combination of coordinated signalized intersection and modernized reversible lane controls. Lanes for the peak direction of travel can be added. The system provides multilane efficiency and is a substitute for more costly improvements. The system is coordinated with all lane control signal locations being operated simultaneously.

Search terms: Traffic lanes; Intersections; Peak hour traffic; Traffic control devices; Memphis; Traffic signals

2/9 Traffic Control (Cont.)

HS-006 511 Fld. 2/9

U.N. WORLD CONFERENCE ON ROAD SIGNS AND SIGNALS

by Kenneth Summerfield

Published in *Traffic Engineering and Control* v11 n1 p31-5 (May 1969)

The recommendations of the United Nations World Conference on Road Signs and Signals, held in Vienna in 1968, are discussed. The convention recognized three classes of signs, for regulation, warning, and information. Differences between British practice and the convention's recommendations for each class are discussed. Differences in road markings, metric units, and eye height recommendations are also outlined.

Search terms: Standardization; Signs (displays); Traffic markings; Eye level; Traffic signs; Highway signs; Directional signs; Warning systems; Signals; Conferences; Great Britain; Measurement; International aspects

HS-006 512 Fld. 2/9

IMPROVEMENT OF TRAFFIC FLOW AND SAFETY BY LONGITUDINAL CONTROL

by Joseph Treiterer

Published in *Transportation Research* v1 p231-51 (1967) 20 refs

A longitudinal control system can render considerable advancement to the present highway system in two areas: traffic flow in regard to stability and capacity and the reduction of rear-end collisions with moving and stopped vehicles. Longitudinal control consists of monitoring the spacing of vehicles travelling in a platoon by means of a driver aid system. It should be particularly useful on urban freeways where the incidence of rear-end collisions is high.

Search terms: Traffic control devices; Traffic flow; Traffic capacity; Freeways; Queueing theory; Urban highways; Rear end collisions; Following distance; Mathematical models; Speed patterns; Unsafe speed; Car following

HS-006 513 Fld. 2/9

INTERNATIONAL STANDARDISATION OF ROAD TRAFFIC SIGNS

by T. G. Usborne

Published in *Traffic Engineering* v37 n10 p20-3 (Jul 1967)

The four different road traffic sign systems in the world are outlined. Great Britain is involved in a ten-year program to replace a million and a half signs. Signs are being modernized and increased in size to match the greater speed and volume of modern traffic and to bring the sign system into line with the one used in Europe. Since signs last about fifteen years, suggestions are made for suitable signs for the 1980's and beyond. A common world language of signs is recommended.

Search terms: Signs (displays); Traffic signs; Highway signs; Inter-

national aspects; Standardization; Great Britain; Europe

HS-006 514 Fld. 2/9

CHARLESTON'S COMPUTERISED TRAFFIC CONTROL SYSTEM

by Harold M. Raynor, Jr.

Published in *Traffic Engineering and Control* v11 n1 p24-7 (May 1969)

A system designed to control 90 vital intersections is described. The system collects traffic flow data, evaluates conditions continuously and responds to the needs of traffic, executes signal control, and verifies the success of signal execution. The computers, detectors, and other equipment are described.

Search terms: Electronic traffic control; Traffic control devices; Traffic flow; Traffic signals; Computers; Detectors; Intersections; Charleston

HS-006 515 Fld. 2/9

REMOTE CONTROL OF TRAFFIC ON THE AUTOBAHN

by Adolf Ranabauer

Published in *Traffic Engineering* v37 n10 p24-30 (Jul 1967)

Remote-controlled traffic sign and

signal system is the only means by which traffic on a periodically congested autobahn in the Munich area can be kept flowing. Speed patterns and restrictions, accident warning, routing are discussed. Closed-circuit television is used on the autobahn. Equipment used in the control center is described. The control system has been in operation about two years and has been successful.

Search terms: Closed circuit television; Traffic control devices; Remote control; Automatic control; Traffic signals; Traffic signs; Traffic congestion; Speed patterns; Traffic flow patterns; Accident protection; Germany

HS-006 516 Fld. 2/9

NEW METHOD IMPROVES TRAFFIC SIGNAL TIMING

by Barry S. Marrus; Murray F. Main
Published in *Traffic Engineering* v34 n9 p23-6 (Jun 1964)

By employing digital computer programs, the city of Hamilton, Ontario reduced delay and stops by 13%. The signal network and the improvements in travel time, number of stops, and dollar savings to motorists are described.

Search terms: Digital computers; Computer programs; Traffic signal networks; Canada; Travel time; Time factors; Costs; Traffic control; Traffic signals; Intersections

HS-006 552 Fld. 1/4; 2/9

HIGH FREQUENCY ACCIDENT LOCATIONS ON THE FEDERAL AID PRIMARY AND FEDERAL AID SECONDARY SYSTEMS

by R. M. Williston

Connecticut. Highway Dept., Wethersfield

May 1966 29p
Report no. TR-2-5

The Connecticut Highway Department conducted a statewide survey of road systems using accident records to determine high accident concentrations. Types of accidents, accident factors, and types of highway improvements are displayed. It was considered significant that 47 of the first 50 locations were signalized indicating that traffic signals are not

2/9 Traffic Control (Cont.)

HS-006 565 Fld. 2/9; 3/12; 1/3

IMPROVED SIGNAL VISIBILITY REDUCES ACCIDENTS

by Arthur L. Kassan; Timothy F. Crowder

Published in *Traffic Engineering* v19 n7 p42-4 (Jun 1969)

Accident history comparison for 68 Los Angeles intersections indicates that improvement in signal visibility reduces the most predominant types of intersection accidents and thus has a high payoff in relation to the relatively low cost of improvement. Signal modernization cost less than \$5,000 per intersection.

Search terms: Benefit cost analysis; Los Angeles; Accident rates; Visibility; Traffic signals; Accident prevention; Costs; Intersections

HS-006 566 Fld. 2/9

METROPOLITAN TORONTO TRAFFIC SURVEILLANCE AND CONTROL SYSTEM

by J. T. Hewton

Published in *Civil Engineering* v39 n2 p49-5 (Feb 1969)

Some 600 conventional traffic signals are tied to a central computer. The system has the potential to make "real time" changes in signal timing depending on changing traffic conditions as detected by vehicle sensors in the pavement. Results indicate 73% shorter average arterial trip times, 86% fewer involuntary stops, and 12% fewer accidents. The equipment used in the system is described.

Search terms: Electronic traffic control; Traffic signals; Traffic characteristics; Travel time; Time factors; Accident rates; Toronto; Detectors; Traffic counters; Traffic surveillance; Traffic control devices; Traffic flow; Real time operations; Computers

HS-006 567 Fld. 2/9; 3/12

COMPUTED DISTANCES OF LEGIBILITY OF STANDARD TRAFFIC CONTROL SIGNS

by H. W. Hofstetter

Published in *Journal of the American Optometric Association* v38 n5 p381-5 (May 1967)

Standardization of highway signs is discussed. A chart prepared by the Bureau of Public Roads, "Standard Traffic Control Signs," illustrates 114 standard signs with specifications of dimension and advice on construction. Another source for sign standardization is the "Manual on Uniform Traffic Control Devices for Streets and Highways," also prepared by the Bureau of Public Roads. The recommended signs have been tested for legibility at 60 mph with 20/20 vision, and results are discussed.

Search terms: Signs (displays); Standardization; Highway signs; Visibility; Speed; Manual on Uniform Traffic Control Devices for Streets and Highways

HS-006 568 Fld. 2/9; 3/4

HUMAN FACTOR CONSIDERATIONS IN TRAFFIC FLOW THEORY

by T. W. Forbes

Published in *Highway Research Record* n15 p60-6 (1963) 14 refs

Many traffic flow theory formulations have been offered. Human factor considerations have been recognized in some but accorded a minor role in most. This paper proposes relationships based on experimental information from previous studies of traffic flow, developing mathematical relationships important for traffic flow theory. Kinds of driver response and psychological effects on driver response times are considered.

Search terms: Mathematical analysis; Traffic flows; Psychological factors; Time factors; Driver behavior; Reaction time

HS-006 569 Fld. 2/9

PEAK-PERIOD CONTROL OF A FREEWAY SYSTEM--SOME THEORETICAL INVESTIGATIONS

by Joseph A. Wattleworth; Donald S. Berry

Published in *Highway Research Record* n89 p1-25 (1965) 11 refs

Presented at the 43rd annual

meeting of the Highway Research Board.

Theoretical considerations pertaining to freeway control during peak traffic periods are considered. Input-output analysis is used to analyze an arbitrary street-freeway system to determine functions and goals of operation. A theory of flow at bottlenecks is developed. Models of traffic behavior, criteria for control techniques, and a linear programming model of the operation of a freeway system are presented.

Search terms: Freeways; Input-output analysis; Linear programming; Streets; Traffic congestion; Peak hour traffic; Traffic control; Mathematical models; Speed patterns; Traffic density; Time factors; Traffic characteristics; Traffic flow

HS-006 570 Fld. 2/9

SPILLBACK FROM AN EXIT RAMP OF AN EXPRESSWAY

by D. C. Gazis

Published in *Highway Research Record* n89 p39-46 (1965)

Presented at the 44th annual meeting of the Highway Research Board.

The problem of control of an oversaturated system comprising an expressway, a highway, and an exit ramp leading from the expressway to the highway is discussed. A traffic light is assumed to control the intersection of the exit ramp and the exit highway. When this intersection becomes oversaturated, the queue along the ramp may spill back into the expressway. Improvement at the exit ramp can be made at the expense of additional delay on the exit highway. Operation of the traffic light is determined for minimum delay.

Search terms: Intersections; Ramps; Traffic signals; Queueing theory; Traffic congestion; Time factors; Traffic capacity; Exits; Controlled access highways; Traffic control; Mathematical analysis

HS-006 571 Fld. 2/9

INTERSECTION DELAY AND LEFT TURN PHASING

2/9 Traffic Control (Cont.)

HS-006-571 (Cont.)

by George Gurnett

Published in *Traffic Engineering* v19 n7 p50-3 (Jun 1969)

Three locations in Los Angeles had minor left turn phasing installed. Before and after delay studies were made to determine how much intersection delay increased after left turn phasing was installed. It was concluded that left turn phasing increased delay per vehicle from 22% to 121%; that peak hour delay may increase over 100%; that left turn delay is not substantially reduced by left turn phasing; and that intersection delay costs outweigh accident reduction savings. However, accident savings should be considered for each individual intersection.

Search terms: Turning left; Intersections; Time factors; Los Angeles; Peak hour traffic; Accident rates; Costs; Traffic planning

HS-006 572 Fld. 2/9; 5/20

EFFECT OF TRUCKS ON FREEWAY FLOWS

by Robert M. Oliver; Leonard Newman

Published in *Highway Research Record* n15 p67-72 (1963) 5 refs

A study is reported on the effect of slow vehicles or trucks on flow density, and travel time characteristics of freeways. It is assumed that trucks travel in the outer of two lanes at a lower speed than cars. Cars in the outer lane queue behind trucks until they find suitable passing gaps. The formation and dissipation of these moving queues are discussed as a function of velocity, density, and passing criteria.

Search terms: Traffic flow; Queueing theory; Trucks; Travel time; Time factors; Freeways; Gap acceptance; Passing (driving); Speed patterns; Traffic density; Mathematical analysis

HS-006 573 Fld. 2/9

IDENTIFICATION AND EVALUATION OF REMEDIAL AID

SYSTEMS FOR PASSING MANEUVERS ON TWO-LANE RURAL ROADS. VOL. 1: SUMMARY REPORT

by Arno Cassel; Michael S. Janoff; Wallace E. Amos

Franklin Inst. Research Labs., Philadelphia, Pa.

Mar 1969 64p 12 refs

Contract CPR-11-4193

Report no. TR-1-201-Vol-1; PB-185 506

The report is presented in 5 volumes. Volume 1, a summary report, discusses the goals and objectives of the study and the research approach adopted to meet those objectives. The research reported in volumes 2-5 is summarized. Primary objectives of this project were to determine the parameters affecting the overtaking and passing maneuver on two-lane rural roads, to investigate possible remedial aid systems and devices to facilitate passing maneuvers, and to assess the economic feasibility of various alternative remedial aid systems.

Search terms: Overtaking (driving); Passing aid systems; Rural highways; Traffic flow; State of the art studies; Computerized simulation; Benefit cost analysis; Passing (driving); Electronic devices; Traffic signs; Highway design; Detectors; Two lane highways; Traffic simulation; Parameters

AVAILABILITY: CFSTI as PB-185 506

HS-006 574 Fld. 2/9

IDENTIFICATION AND EVALUATION OF REMEDIAL AID SYSTEMS FOR PASSING MANEUVERS OF TWO-LANE RURAL ROADS. VOL. 2. IDENTIFICATION OF PARAMETERS AFFECTING OVERTAKING AND PASSING

by Arno Cassel; Michael S. Janoff

Franklin Inst. Research Labs., Philadelphia, Pa.

Mar 1969 92p 95 refs

Contract CPR-11-4193

Report no. TR-1-201-Vol-2; PB-185 507

This volume describes the traffic flow and safety problems on two-lane rural roads and identifies the most signifi-

cant parameters affecting traffic flow and safety during overtaking and passing. Three general classes of remedial aids were considered: (1) road reconstruction and modification to design standards, (2) traffic control devices such as signs and markings for passing and no-passing zones, and (3) electronic or electro-mechanical devices which provide information to drivers on traffic and roadway conditions

Search terms: Parameters; Traffic control devices; Overtaking (driving); Passing (driving); Driver behavior; Rural highways; Traffic flow; Electronic devices; Highway design; Traffic signs; Motor vehicle characteristics; Highway characteristics; Two lane highways; Passing aid systems; Traffic markings; Gap acceptance; Visibility; Accident causes

AVAILABILITY: CFSTI as PB-185 507

HS-006 575 Fld. 2/9

IDENTIFICATION AND EVALUATION OF REMEDIAL AID SYSTEMS FOR PASSING MANEUVERS ON TWO-LANE RURAL ROADS. VOL. 3. STATE-OF-THE-ART REVIEW AND CONCEPTUALIZATION OF REMEDIAL AID SYSTEMS FOR PASSING MANEUVERS

by Michael S. Janoff; Wallace E. Amos; Arno Cassel

Franklin Inst. Research Labs., Philadelphia, Pa.

Mar 1969 100p 104 refs

Contract CPR-11-4193

Report no. TR-1-201-Vol-3; PB-185 508

This state-of-the-art review discusses four kinds of remedial aids in passing and overtaking: (1) surveillance devices, (2) driver information and warning devices, (3) common traffic control devices, and (4) automated vehicle control devices and automated highways. Since a commercial passing-aid system was not available, it was necessary to conceive such a system. The two major classifications determined were: (1) Presence-only systems in which only vehicle presence is sensed; (2) speed-sensing systems (which include presence inherently).

2/9 Traffic Control (Cont.)

HS-006-575 (Cont.)

Search terms: Accident rates; Overtaking (driving); Passing aid systems; Rural highways; Automatic highways; Traffic flow; State of the art studies; Electronic devices; Traffic control devices; Traffic signs; Automatically guided automobiles; Two lane highways; Visibility; Speed patterns; Warning systems; Traffic surveillance; Benefit cost analysis; Detectors; Highway design; Passing (driving); Hearing

AVAILABILITY: CFSTI as PB-185 508

HS-006 576 Fld. 2/9

IDENTIFICATION AND EVALUATION OF REMEDIAL AID SYSTEMS FOR PASSING MANEUVERS ON TWO-LANE RURAL ROADS. VOL. 4. TRAFFIC FLOW MODEL

by Michael S. Janoff; Arno Cassel

Franklin Inst. Research Labs., Philadelphia, Pa.

Mar 1969 129p 14 refs

Contract CPR-11-4193

Report no. TR-1-201-Vol-4; PB-185 509

This volume describes a computer simulation of a two-lane rural road. Programmed in FORTRAN IV, the model evaluates the traffic flow and safety benefits of alternative remedial devices which would assist drivers during passing maneuvers on two-lane rural roads. Results indicate that remedial aids systems are effective under various driving conditions in increasing traffic volume and safety.

Search terms: Overtaking (driving); Passing (driving); Passing aid systems; Rural highways; Computerized simulation; Fortran; Computer programs; Time factors; Traffic flow; Highway safety; Two lane highways; Traffic simulation; Traffic volume; Mathematical models; Parameters; Speed patterns

AVAILABILITY: CFSTI as PB-185 509

HS-006 577 Fld. 2/9

IDENTIFICATION AND EVALUATION OF REMEDIAL AID SYSTEMS FOR PASSING MANEUVERS ON TWO-LANE RURAL ROADS. VOL. 5: ECONOMIC ANALYSIS OF PASSING AID SYSTEMS

by Arno Cassel; Michael S. Janoff

Franklin Inst. Research Labs., Philadelphia, Pa.

Mar 1969 70p 12 refs

Contract CPR-11-4193

Report no. TR-1-201-Vol-5; PB-185 510

An economic analysis of alternative remedial aid systems for passing maneuvers is described in this volume. The costs and benefits of construction remedial aids, traffic control devices, and electronic and electromechanical systems which provide additional information to the driver were compared to identify the most cost-effective aids. Three of the five electronic and electromechanical aids have greater benefit/cost ratios than construction aids. However, because of the relatively high costs of remedial aid systems and the conservative assumptions regarding their use, none of the systems had benefit cost ratios greater than one.

Search terms: Benefit cost analysis; Passing aid systems; Rural highways; Traffic signs; Highway design; Electronic devices; Traffic flow; Computerized simulation; Two lane highways; Economic analysis; Traffic simulation; Highway construction; Gap acceptance; Mathematical models; Speed patterns; Traffic control devices

AVAILABILITY: CFSTI as PB-185 510

HS-006 615 Fld. 2/9

A SIGN INVENTORY PROCEDURE

by James M. Vasconcelles

Published in *Traffic Engineering* v40 n1 p36-41 (Oct 1969)

Standardization of traffic signs is becoming increasingly important because of the conditions of modern driving. Many states have adopted standards for their signs. Signs not meeting the standards have no legal

status. A sign inventory in Illinois is described. Each sign has been numbered so that it can be located. Data collection and processing and the computer programs used are described. Cost estimates are given for improving signs not meeting the standards.

Search terms: Standardization; Signs (displays); Traffic signs; Highway signs; Data acquisition; Data processing; Computer programs; Costs; Illinois; Legal factors

HS-006 616 Fld. 2/9

SIMULATION OF TRAFFIC FLOW TO OBTAIN VOLUME WARRANTS FOR INTERSECTION CONTROL

by Russell M. Lewis; Harold L. Michael

Published in *Highway Research Record* n15 p1-43 (1963) 46 refs

A digital simulation model was developed to determine volume warrants at street intersections. The intersection studied was the four-legged, right-angled intersection of a high-volume major arterial street with a lower-volume minor arterial street. The major arterial had four lanes with parking prohibited, and the minor arterial had two lanes with parking allowed. Two types of intersection control were studied, the semi-traffic actuated signal and the two-way stop sign. Delays at the intersection were measured and used as criteria for the establishment of warrants.

Search terms: Arterial streets; Simulation models; Traffic simulation; Computerized simulation; Intersections; Traffic volume; Parking; Stop signs; Time factors; Traffic flow; Traffic control; Traffic actuated signals; Mathematical analysis; Traffic signals

HS-006 619 Fld. 3/4; 2/9

THE DRIVER AND TRAFFIC CONTROL DEVICES

by William R. Reilly; Donald L. Woods

Published in *Traffic Engineering* v37 n9 p49-52 (Jun 1967)

A multiple choice test was given to

2/9 Traffic Control (Cont.)

HS-006-619 (Cont.)

280 persons in three groups, safety conference participants, high school students, and city employees, to measure driver comprehension of traffic control devices. It was concluded that drivers have a very limited knowledge of the intention of traffic signs and markings; that more information on traffic control devices should be included in driver education courses; that a pamphlet on the subject should be distributed at driver licensing bureaus; and that research is needed to eliminate poor devices and improve traffic controls and laws.

Search terms: Traffic control devices; Traffic signs; Traffic markings; Driver education; Traffic laws; High school drivers; Driver tests; Driver licensing

HS-006 678 Fld. 2/9

TRAFFIC ENGINEERING IN MEXICO: EFFECTS OF THE CAR-INVASION ON MEXICO

by Rafael Cal y Mayor

Published in *Traffic Engineering* v34 n3 p11-6, 43 (Dec 1963)

The rapid increase in motor vehicle numbers and the inadequacy of the street system in cities are discussed. Traffic engineering is beginning to be applied on a large scale in Mexico. Traffic volume and congestion, origin and destination studies; accident analysis; signs, signals, and markings; channelization; and urban and rural expressways are discussed.

Search terms: Mexico; Traffic engineering; Traffic volume; Traffic congestion; Traffic flow patterns; Travel patterns; Traffic data analysis; Accident analysis; Traffic signs; Traffic signals; Traffic markings; Controlled access highways; Freeways; Urban highways; Rural highways; Streets

HS-006 679 Fld. 2/9

EXTENSION AND PRELIMINARY VALIDATION OF A SIMULATION OF LOAD FACTOR AT SIGNALIZED INTERSECTIONS

by Adolf D. May; Peter Gyamfi

Published in *Traffic Engineering* v40 n1 p46-52 (Oct 1969) 6 refs

The objective of this study was to determine the relationships between load factor, average individual delay, and degree of saturation at signalized intersections. The model consists of processing arriving vehicles through a fixed-time traffic signal for a single approach for one hour. The simulation model was successfully modified to permit utilizing measured as well as mathematical arrival and discharge headway distributions. Eight conclusions are presented regarding headway distribution, load factor curves, and delays.

Search terms: Headway; Time factors; Intersections; Traffic simulation; Simulation models; Mathematical models; Traffic signals; Queueing theory; Traffic volume; Traffic congestion

HS-006 680 Fld. 2/9

VEHICLE SPEEDS AND HEADWAYS AT NORTHERN END OF M1

by R. J. Salter

Published in *Highways and Traffic Engineering* v37 n1717 p34, 36 (Sep 1969)

Observations were made of vehicle speeds, headways, sizes, and types of vehicles. Speed and headway were analyzed by direction of travel and type of vehicle. Passenger cars going north averaged 51 mph, commercial vehicles 43 mph. Passenger cars going south averaged 58 mph, commercial vehicles 52 mph.

Search terms: Speed patterns; Headway; Commercial vehicles; Automobiles; Vehicle size; Travel patterns; Great Britain

HS-006 681 Fld. 2/9

AN AERIAL PHOTOGRAPHY TECHNIQUE FOR TRAFFIC RESEARCH

by Thomas G. Williams

Published in *Texas Transportation Researcher* v3 n1 p3-6 (Jan 1967)

In research involving gap acceptance and traffic interaction in the freeway merging process, aerial photography has been used successfully. This study determines the effects of various

geometric and traffic elements on the merging process. Measurements of traffic, geometric, and vehicle characteristics are to be used to validate a simulation model for the merging process.

Search terms: Aerial photography; Merging traffic; Simulation models; Traffic surveys; Freeways; Ramps; Gap acceptance; Traffic flow; Traffic characteristics; Peak hour traffic

HS-006 682 Fld. 2/9; 3/12

FACTORS IN HIGHWAY SIGN VISIBILITY

by T. W. Forbes

Published in *Traffic Engineering* v39 n12 p20-7 (Sep 1969) 12 refs

This research summarizes a systematic study of sign visibility. The research consisted of laboratory simulation experiments and a full-scale outdoor check to relate the results to real life observations. The results showed essentially that brightness contrast factors were of greatest importance and that contrast of letter-to-sign and sign-to-background should be balanced for best visibility and effectiveness. Hue contrast was also of importance, but secondary to brightness or lightness contrast. Relative size factors were important where several signs were seen at once.

Search terms: Visibility; Highway signs; Brightness; Color; Mathematical models; Laboratory tests; Simulation models; Field tests; Contrast; Color perception; Signs (displays); Visual perception

HS-006 683 Fld. 2/9

PROPOSED REAL-TIME SURVEILLANCE AND CONTROL SYSTEM FOR LOS ANGELES

by John West

California. Div. of Highways, Sacramento

1969 21p

Presented to Highway Research Board Freeway Operations Committee, Los Angeles, Calif., 28 Aug 1969.

The Los Angeles Area Freeway Surveillance and Control Project has two

2/9 Traffic Control (Cont.)

HS-006-683 (Cont.)

prime objectives: to test and evaluate various techniques for improving freeway operation, and to integrate those techniques showing greatest promise into an effective centrally controlled freeway surveillance and control system. Techniques being tested are ramp control, detection and removal of disabled vehicles and hazards, warning and information for the motorist by radio and changeable signs, and service for the stranded motorist.

Search terms: Freeways; Los Angeles; Electronic traffic control; Ramps; Debris removal; Hazards; Emergency services; Highway communication; Traffic surveillance; Disabled vehicles; Access control; Radio communication; Highway signs; Warning systems

AVAILABILITY: Corporate author

HS-006 684 Fld. 2/9

USE OF A RUMBLE STRIPE TO REDUCE MAINTENANCE AND INCREASE DRIVING SAFETY. INTERIM REPORT

by Wallace J. Liddle; George M. Jones; Dale E. Peterson; Kenneth D. Farrimond

Utah. Dept. of Highways, Salt Lake City

Dec 1968 37p

Report no. Utah-RR-500-901; BPR-Study-9; PB-182 449

Driving safety is increased by using a textured highway paint stripe called the rumble stripe. The stripe consists of a longitudinal groove pattern the length of the regular paint stripe and transverse cuts which allow drainage and provide the rumble effect. Investigation showed that the rumble stripe is superior to the regular stripe in visibility especially during rain storms. The rumble or visibility stripe is recommended for highways where raised traffic markers are subject to snow plow damage.

Search terms: Rumble strips; Traffic markings; Traffic lanes; Paints; Visibility; Wet road conditions; Highway maintenance; Grooving; Rain

AVAILABILITY: CFSTI

HS-006 721 Fld. 2/4; 2/9

LOW VOLUME RURAL Y JUNCTIONS

by R. T. Underwood

Published in *Australian Road Research* v2 n8 p3-23 (Jun 1966) 7 refs

Three basic ways of treating the low volume rural Y intersection are discussed. An attempt is made to set out the conditions and range of volumes for which each type is suitable. Design features of each type are discussed. The Y junction is characterized by two traffic streams crossing at flat angles, resulting in potential collisions, many of which are almost head-on. It is a common type of intersection in rural areas.

Search terms: Accident risks; Intersections; Rural highways; Highway design; Head on collisions; Australia; Traffic volume; Traffic data analysis; Mathematical models; Traffic control

HS-006 729 Fld. 2/9; 4/7

THE EFFECT OF SHORT CARS ON FLOW AND SPEED IN DOWNTOWN TRAFFIC: A SIMULATION MODEL AND SOME RESULTS

by John W. McClenahan; Howard J. Simkowitz

Published in *Transportation Science* v3 n2 p 126-39 (May 1969) 6 refs

The flow of vehicles down one lane of a straight, signalized urban street with fixed cycle traffic lights at 500-foot intervals was simulated by means of a Fortran IV computer program. A car-following model and a simple model of lead-driver behavior were used to model driver responses. Flow and speed measurements were made for levels of congestion in which queues developed at traffic lights. The simulation model was constructed to investigate the effect of vehicle length on speed and flow. Results indicate that substitution of all small cars for all large cars would increase flow 70%.

Search terms: Simulation models; Traffic simulation; Traffic flow patterns; Traffic signals; Computer programs; Fortran; Vehicle size; Small cars; Traffic congestion; Car

following; Driver behavior; Speed patterns; Queueing theory; Central business districts; Compact cars

HS-006 730 Fld. 2/9

POSSIBLE FLOW MEASUREMENTS

by Salem Spitz

Published in *Traffic Engineering* v37 n9 p17-20 (Jun 1967) 8 refs

A method is presented by which traffic engineers can measure a special case of saturation flow called "possible flow." The technique provides for the effect of every factor which might affect traffic flow during the period of observation and provides the accuracy and insight needed to solve many problems of traffic operation under peak flow conditions.

Search terms: Traffic flow; Peak hour traffic; Traffic capacity; Traffic congestion; Traffic engineering; Traffic data analysis; Vehicle platoons

HS-006 731 Fld. 2/9

SIMULATION OF TRAFFIC AT A TWO-WAY STOP INTERSECTION

by James N. Thomasson, Jr.; Paul H. Wright

Published in *Traffic Engineering* v37 n11 p39-45 (Aug 1967)

The objectives of the research described were to simulate on a digital computer a street intersection controlled by two-way stop signs, and by using the simulation model to study the operational characteristics of the intersection. It is concluded that simulation is an effective study technique. Time lag and gap acceptance patterns are analyzed.

Search terms: Traffic simulation; Simulation models; Intersections; Time factors; Gap acceptance; Digital computers; Stop signs; Mathematical models; Traffic flow patterns

HS-006 732 Fld. 2/9

TAKING THE SCOURGE OUT OF THE MERGE. Part 1. RESEARCHING THE PROBLEM

2/9 Traffic Control (Cont.)

HS-006-732 (Cont.)

by Donald R. Drew

Published in *Traffic Engineering* v37 n11 p48-52 (Aug 1967) 7 refs

The development of an automatic freeway merging control system which aids the entrance ramp driver in the complicated merging maneuver is described. Research was done to determine the basic characteristics necessary for a merging control system and to construct a working prototype. Gap acceptance characteristics and the effects of speeds on merging are analyzed.

Search terms: Freeways; Merging traffic; Traffic control; Ramps; Gap acceptance; Speed patterns; Automatic control; Mathematical models

HS-006 733 Fld. 2/9

THE TRIANGULAR NO PASSING ZONE SIGN—AN EVALUATION

by Donald F. Petty

Published in *Traffic Engineering* v39 n10 p40-43 (Jul 1969)

Several studies indicate that driver reaction to a sign reading "no passing zone" is better than reaction to a "do not pass" sign. A study was undertaken in Indiana to evaluate the effectiveness of installing "no passing zone" signs on the left side of the road, in addition to "do not pass" signs on the right. Driver behavior and accident rates were compared before and after installation of the additional signs. It was concluded that fewer aborted attempts were made to pass. Installation of the additional signs is therefore recommended.

Search terms: Driver behavior; Indiana; Highway signs; Accident rates; Passing (driving)

HS-006 734 Fld. 2/9; 2/4

MEASUREMENT OF DIRECTIONAL FLOWS AT JUNCTIONS

by M. Peleg

Published in *Traffic Engineering & Control* v10 n6 p307-8 (Oct 1968)

In order to design a junction, including shape, dimensions, and signal pattern, the volume of traffic according to each destination must be known. Procedure for making a traffic count at a four-leg junction is described. Making a traffic count for a circle is also discussed.

Search terms: Traffic volume; Interchanges; Traffic data analysis; Traffic circles; Traffic surveys; Highway design

HS-006 735 Fld. 2/9

INNOVATIONS IN HIGHWAY TRAFFIC SYSTEMS

by C. F. Izzard

Published in *Public Works* v100 n8 p105-10 (Aug 1969)

While fully automated highways are far in the future, some features are close to realization and may revolutionize driving and traffic control. The Electronic Route Guidance System (ERGS), automatic control of on-ramp merging, passing aid systems, systems to aid stranded motorists, and systems for urban traffic control are described. The development of expressways, solid-state devices, computerization, and message transmission devices are solid accomplishments.

Search terms: Automatic control; Automatic highways; Traffic control devices; Driving tasks; Electronic Route Guidance System; Merging traffic; Ramps; Passing aid systems; Disabled vehicles; Urban areas; Controlled access highways; Computers; Communication systems

HS-006 736 Fld. 2/9; 4/5

A TECHNIQUE FOR THE MEASUREMENT OF TRAFFIC PARAMETERS IN ENVIRONMENTAL STUDIES

by Robert Jones

Published in *Traffic Engineering & Control* v10 n7 p358-60 (Nov 1968)

Measurements of traffic parameters were made using time lapse photography. A program was written to compute for each vehicle 7 descriptive parameters: ground ordinate; vehicle travel; spacing or

headway; time headway; stream speed; flow; and concentration or spacing. The analysis of these movements can be used to identify associated effects, particularly in environmental studies, and is also useful in studies of vehicle behavior at intersections.

Search terms: Parameters; Photography; Computer programs; Travel patterns; Headway; Speed patterns; Traffic flow patterns; Time factors; Environmental factors; Intersections; Traffic data analysis

HS-006 737 Fld. 2/9

O.T.A. STUDY WEEK: GENERAL REPORT ON THEME 8. MOTORWAY SURVEILLANCE AND CONTROL

by J. T. Duff

Published in *Traffic Engineering & Control* v10 n6 p314-6, 324 (Oct 1968) 7 refs

Freeway surveillance and traffic control systems in Great Britain, France, Germany, and the United States are discussed. The purposes of traffic surveillance; the techniques and equipment used; ramp metering; detectors, signs, and signals; data processing and transmission; police role are discussed. Vehicle communications and vehicle guidance systems being developed will increase the possibilities of traffic control.

Search terms: Traffic surveillance; Traffic control devices; Great Britain; France; Germany; United States; Ramps; Access control; Detectors; Traffic signs; Traffic signals; Data processing; Police traffic services; Automatic control; Highway communication; Guidance systems; Freeways; Electronic traffic control; Data processing

HS-006 757 Fld. 4/7; 2/9

MATHEMATICAL THEORY OF AUTOMOBILE TRAFFIC

by Denos C. Gazis

Published in *Science* v157 n3786 p273-81 (21 Jul 1967) 80 refs

Improved understanding and control of traffic flow is a fast-growing area of scientific research. Traffic flow models, especially car following models, are discussed. Traffic con-

2/9 Traffic Control (Cont.)

HS-006-757 (Cont.)

flicts, applications of statistics to this problem, traffic control studies, and traffic networks are described.

Search terms: Bibliographies; Mathematical analysis; Traffic flow; Car following; Statistical analysis; Traffic control; Traffic research; Traffic systems; Traffic engineering; Traffic characteristics; Simulation models; Mathematical models

HS-006 758 Fld. 4/7; 2/9

SOME APPLICATIONS OF SAMPLE SURVEY AND EXPERIMENTAL DESIGN TO ROAD TRAFFIC

by Alan J. Miller

New South Wales Univ., Sidney (Australia). Inst. of Highway and Traffic Research

(1962) 15p 7 refs

The methods of sample survey design are more relevant to road traffic than the design of experiments. Various surveys and experiments are described, including before-and-after studies, the Birmingham dipped headlights campaign, a speed limit study, a journey time study using Graeco-Latin square design, sample surveys of traffic data, vehicle counting census methods. The work discussed took place in Great Britain and Australia.

Search terms: Traffic engineering; Statistical analysis; Surveys; Travel patterns; Traffic flow patterns; Speed limits; Dimmed headlights; Traffic data analysis; Traffic counters; Great Britain; Australia; Travel time

AVAILABILITY: Corporate author

HS-005 061 Fld. 2/9

CENTRALISED COMPUTER CONTROL OF TRAFFIC SIGNALS. REPORT FROM MUNICH

by Gerhard Pavel

Published in *Traffic Engineering & Control* v9 n5 p232-6 (Sep 1967) 9 refs

Traffic signal systems can raise the traffic output at intersections, enhance safety, facilitate orderly flow. Some of the problems and operating methods for traffic data processing systems using electronic computers are noted. Special reference is made to the system first installed in Berlin.

Search terms: Traffic signals, Traffic control devices, Computers, Electronic traffic control, Traffic flow patterns, Traffic simulation, Europe*, Canada*, United States*, Traffic counters*, Detectors, Time factors*, Traffic control systems*, Television systems, Traffic signal networks*

HS-005 959 Fld. 2/9

TWO-LANE ENTRANCE RAMPS

by Ronald C. Pfefer

Published in *Traffic Engineering* v39 n2 p18-21, 23 (Nov 1968) 9 refs

The growing volume of freeway traffic has brought about increasing consideration of the use of two-lane entrance ramps. This discussion reflects the conclusions of Committee 5-F of the Institute of Traffic Engineers' Technical Council and on information obtained by survey questionnaire. Six research problems dealing with ramp design are outlined.

Search terms: Ramps; Merging traffic; Lane capacity; Highway design; Interchanges; Questionnaires*; Freeway planning; Traffic volume

2/10 TRAFFIC COURTS

HS-005 405 Fid. 2/10

DETERMINING ELEMENTS OF THE OFFENSE

by Edward C. Fisher

Published in *Traffic Digest and Review* v16 n9 p9-15 (Sep 1968)

Traffic law enforcement officers must familiarize themselves with various provisions of a traffic code so as to recognize the elements of each offense. Drivers cannot be charged for committing acts not prohibited by law or failing to perform acts not required. A number of traffic offenses are analyzed and the difference between elements of the offense and proof of the offense discussed.

Search terms: Traffic law enforcement; Traffic accident analysis; Accident investigation; Traffic laws; Accident responsibility; Negligence*; Evidence; Police; Traffic violations

HS-820 043 Fid. 2/10

HIGHWAY SAFETY PROGRAM MANUAL. VOLUME 7. TRAFFIC COURTS

National Highway Safety Bureau, Washington, D.C.

Jan 1969 37p 7 refs

One of 17 volumes, two of which (vols. 12 and 13) are as yet unissued (see HS-820 036 to HS-820 050).

The complete manual supplements the Highway Safety Program Standards and presents additional information to assist State and local agencies to implement their highway safety programs. This volume provides guidelines to the states for developing an effective traffic court system and reporting convictions for moving traffic violations.

Search terms: Highway safety; Safety programs; State government; Local government*; Traffic courts; Traffic violations; Convictions

AVAILABILITY: Federal Highway Administration, Washington, D.C. 20591, Attn: Records Management Branch. \$1.70

2/11 TRAFFIC RECORDS

HS-820 046 Fld. 2/11

HIGHWAY SAFETY PROGRAM MANUAL. VOLUME 10. TRAFFIC RECORDS

National Highway Safety Bureau,
Washington, D.C.

Jan 1969 83p 15 refs

One of 17 volumes, two of which
(vols. 12 and 13) are as yet
unissued (see HS-820 036 to
HS-820 050).

The complete manual supplements
the Highway Safety Program Stan-
dards and presents additional infor-
mation to assist State and local
agencies to implement their highway
safety programs. This volume deals
with Traffic Records Programs which
provide for routine collection of data
for use in coordinated Federal, State,
and local traffic safety programs. The
information collected pertains to
drivers, vehicles, highways, and collis-
ions linked to the involved drivers,
vehicles, and highway locations.

Search terms: Highway Safety;
Safety programs; State government;
Local government*; Traffic records;
Accident records; Traffic accidents;
Accident location; Data acquisition;
Federal-state relationships*

AVAILABILITY: Federal Highway
Administration, Washington, D.C.
20591, Attn: Records Management
Branch. \$4.00